All tutorial files can also be downloaded from: www.3dartistonline.com/files

www.3DArtistonline.com

3DArtist

53

Practical inspiration for the 3D community

MASTER ZBRUSH

Experts in digital clay show you how to concept and create leading characters

GET A JOB IN THE GAMES INDUSTRY

We reveal the exciting roles for CG artists

8-PAGE GUIDE

SCULPT THIS CHARACTER

FROM SKETCH TO FINAL MODEL

BEHIND THE SCENES: BIOSHOCK INFINITE

Irrational Games uncovers its workflow for bringing an epic floating city to life

Soft-body dynamics

Bring your scenes to life with the excellent new features in LightWave 11.5

RIG VEHICLES IN MAYA

Our pro guide to help you build great-looking cars

ANATOMY MASTERCLASS

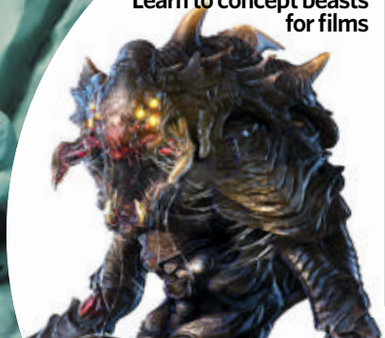
Perfect the human form with our step-by-step tutorial

CLEAN UP 3D MODELS

Discover secrets for retopologising in 3ds Max

EXPLORE ALIEN DESIGN

Learn to concept beasts for films



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KeyShot 4

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http://be.net/RowO

www.keyshot.com

> I will be focusing on high-res modelling using techniques geared towards baking down Normal maps for videogame assets

Gavin Goulden shares his expertise. **Page 54**

As we sit on the brink of next-gen videogame consoles and see Kickstarter funding projects the world over, the videogames industry is an exciting place to be for 3D artists right now. So, to celebrate, this issue we've brought together some talented studios that share insider insights and tips galore.

First up, we mark the release of *BioShock Infinite* and go behind the scenes at Irrational Games to see how it brought the title to life. Next, Jorge Lacera and Gavin Goulden from the Irrational team show us how to concept and create our very own character. Next issue (#54) Gavin will explain how to tackle the low-poly modelling, UVs, painting, rigging and posing of the high-poly model created this issue, so now is a great time to subscribe, if you haven't already!

This issue's Studio Access delves into the mind of Crytek, unveiling the jaw-dropping, photoreal visuals of *Crysis 3*, while probing what the future holds for CryENGINE. Moonbot Studios also drops by to share top tips for crowdfunding indie projects on Kickstarter and reveals the making of its very first videogame, *The Golem*.

If all this fires your interest in pursuing a career in videogames, check out our 'Get a job in the games industry' feature, where artists working in the trenches across the globe bring you real-world advice. But, if you're not quite ready for all that, pop your favourite console on and play some games. We won't judge, promise!

Games issue special

Behind the scenes at top studios + step-by-step tutorials by the experts

With the Disc

Free with this issue:

- Helpful tutorial files for the step-by-step guide by Irrational Games' Gavin Goulden (page 54). Files include the Spacegirl ZTL, custom Alphas and screenshots from the tutorial

Create the cover with our exclusive eight-page tutorial by the artists behind *BioShock Infinite*. Turn to page 52 to see how Jorge Lacera tackles concept art for 3D artists, then begin modelling with Gavin Goulden on page 54. You'll find tutorial files to help you master your craft with this issue's disc, or you can download them from our website: **www.3dartistonline.com/files**.

Welcome

to the magazine and 116 pages of amazing 3D

Every issue you can count on...

1. **Exclusively commissioned art**
2. Behind-the-scenes guides to images and fantastic artwork
3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

Welcome to our game-art special issue, featuring exclusive training from Irrational Games artists themselves. If you've ever wanted to get into the videogames industry, you can learn from the pros to fashion your own character concepts and then build impressive models in ZBrush. We've also compiled a handy feature on some of the exciting jobs in the industry for creative types, plus go behind the scenes of *BioShock Infinite* to see how this truly epic title was brought to life.

Also packed into this issue we have expert tuition to show you how to rig vehicles for animation. As usual this comes complete with tutorial files so you can jump straight behind the wheel.

Enjoy the issue!

Lynette

This issue's team of expert artists...

Jorge Lacera

We're super-excited to welcome this talented storyteller and picture maker to **3D Artist**. See him concept a spacegirl!

Gavin Goulden

Joining forces with Jorge Lacera, Irrational Games' Gavin Goulden turns a beaut of a concept into a high-res sculpt

Justin Fields

When we decided we wanted a beastly alien to adorn our pages, we hit up the talented Mr. Fields to share his pro ZBrush workflow

Jahirul Amin

After modelling an awesome retro vehicle in issue 52, our guy J is back to teach us how to rig it ripe 'n' ready for animation

Mohammad Modarres

If you have ever seen Mohammad's stunningly realistic sculpts, you'll understand why we've drafted him in

Gavin Rich

New to **3D Artist** magazine, Gavin drops by to reveal his expert tricks for retopologising ZBrush models in 3ds Max

Craig A. Clark

Multi-tasking like a genius, Craig brings us a fantastic LightWave 11.5 tutorial and checks out KeyShot 4 Pro

Richard Yot

Our modo guru treats us to a spot of creature-concepting with a delightful little tutorial featuring his much-loved style

José Alves da Silva

José gets stuck into the ins and outs of TopoGun to reveal how the handy software can help you retopologise models

Michael Burns

Chit-chatting to Moonbot Studios, Michael uncovers a few tips for pushing indie game projects through Kickstarter

Poz Watson

Poz tracks down and talks to helpings of games industry experts to reveal the top jobs and what they can involve

This could be you!

Fancy yourself as a 3D expert? Submit your work and tutorial ideas to the team at 3dartist@imagine-publishing.co.uk

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3D Artist

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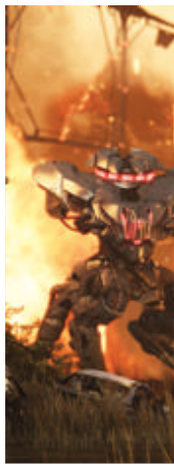
3D Artist talks to Irrational Games about how it forged a world in the clouds



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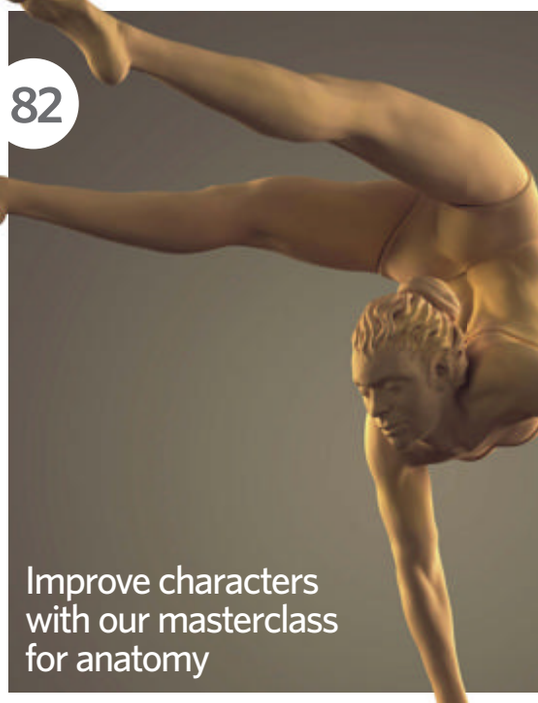
Learn the art of concepting monsters for the movies



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Improve characters with our masterclass for anatomy

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Turn to page 80 for details

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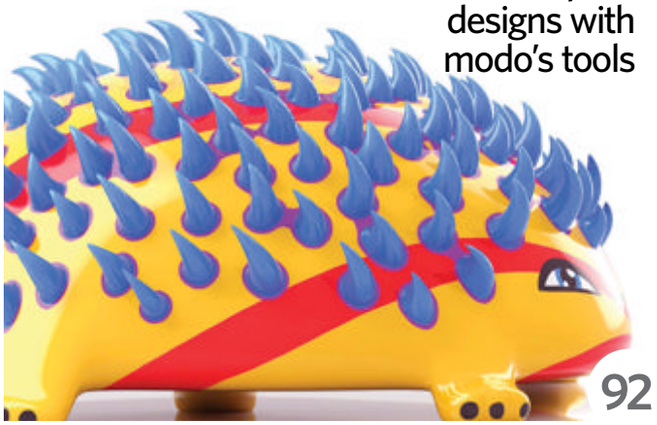

Knock out quick designs with modo's tools

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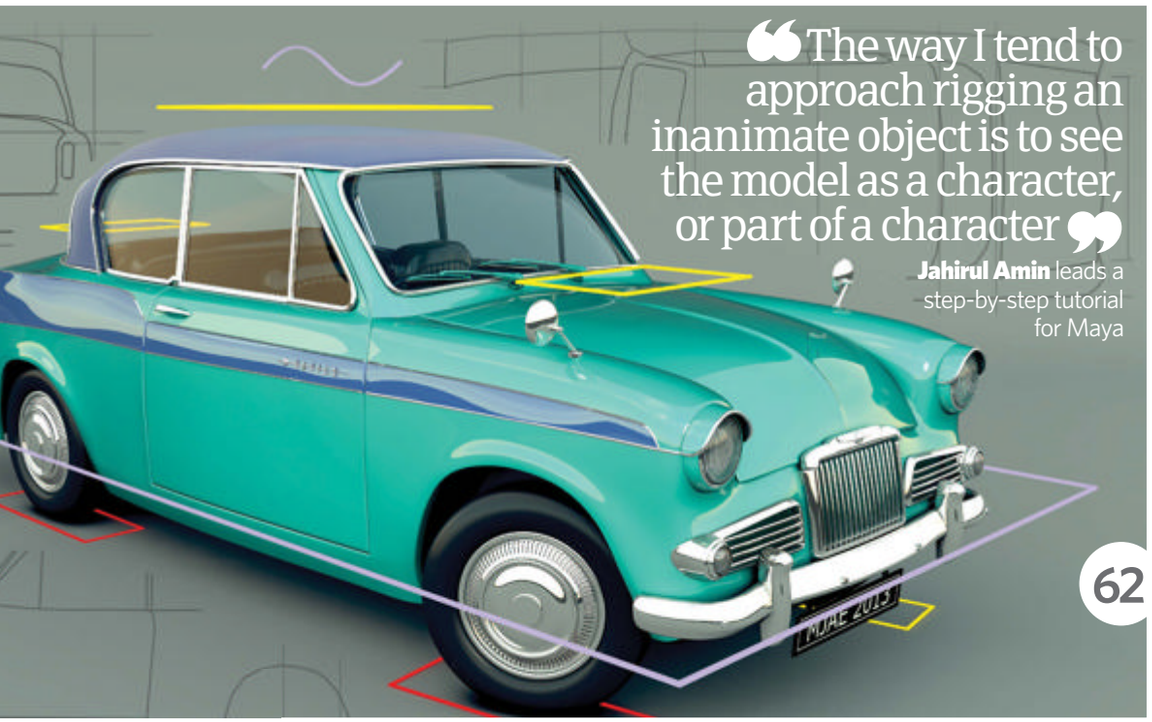

"The way I tend to approach rigging an inanimate object is to see the model as a character, or part of a character"

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Creature design in modo

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Turn to page 112 for the complete list of the disc's contents

WELCOME TO

THE GALLERY

Seven pages of great artwork from the 3D community

Images we love!

Marcello Baldari

3DArtistonline

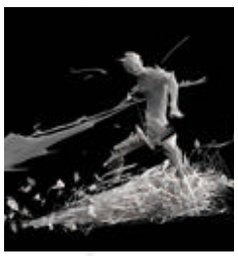
Username: Marcello

Personal portfolio site
www.marcellobaldari.com

Country Italy

Software used ZBrush, Photoshop

Work in progress...



“The real challenge with realising the *Ink Warrior* was trying to get close to a style like concept art rather than a traditional 3D illustration. I wanted everything to look like a sketch – dirty, dynamic lines and fresh – but with everything created in 3D”

Marcello Baldari, *Polysketch – Ink Warrior,* 2012

Have an image you feel passionate about? Get your artwork featured in these pages

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Share your art, comment on other artists' images

Artist info

Jiri Adamec

When Jiri isn't creating amazing 3D images he works as a chef in the Czech Republic

Personal portfolio site
www.a-stil.cz

Country Czech Republic

Software used 3ds Max, V-Ray

Work in progress...

"Working on this image took me about one month. From the beginning I wanted to create a gorilla in an original environment. The biggest problem I encountered on this project was with the animal's hair, which took me a lot of time"

Jiri Adamec, *Gorilla Chief,* 2012

3DArtist Loves

"This well-groomed gorilla captures great personality – he really looks like he owns the scene. His expression is fantastic and convincingly sells the shot. Excellent!"

Lynette Deputy Editor

3DArtist Loves

"The composition of this beast is fantastic – it really gives depth to the scene and encourages your mind to unravel the length of that mighty body. We're just glad there's a sheet of paper between us and those fangs!"

Lynette Deputy Editor

"I really wanted to challenge myself in ZBrush to make a highly detailed creature. This project also gave me the occasion to improve my hand-painted techniques for the texturing process"

Adam Lacharité, *The Snake,* 2013

Artist info

Adam Lacharité

3DArtist online

Username: Adamlacharite

Personal portfolio site
http://alacharitelefeb.en3d.ca

Country Canada

Software used ZBrush, 3ds Max, Photoshop

Work in progress...

Artist info

Pascal Ackermann

Pascal works as a lead 3D artist. This particular image was made to improve his ZBrush skills

Personal portfolio site
http://pascal.ackermann.free.fr

Country France

Software used ZBrush, 3ds Max, Photoshop, After Effects

Work in progress...

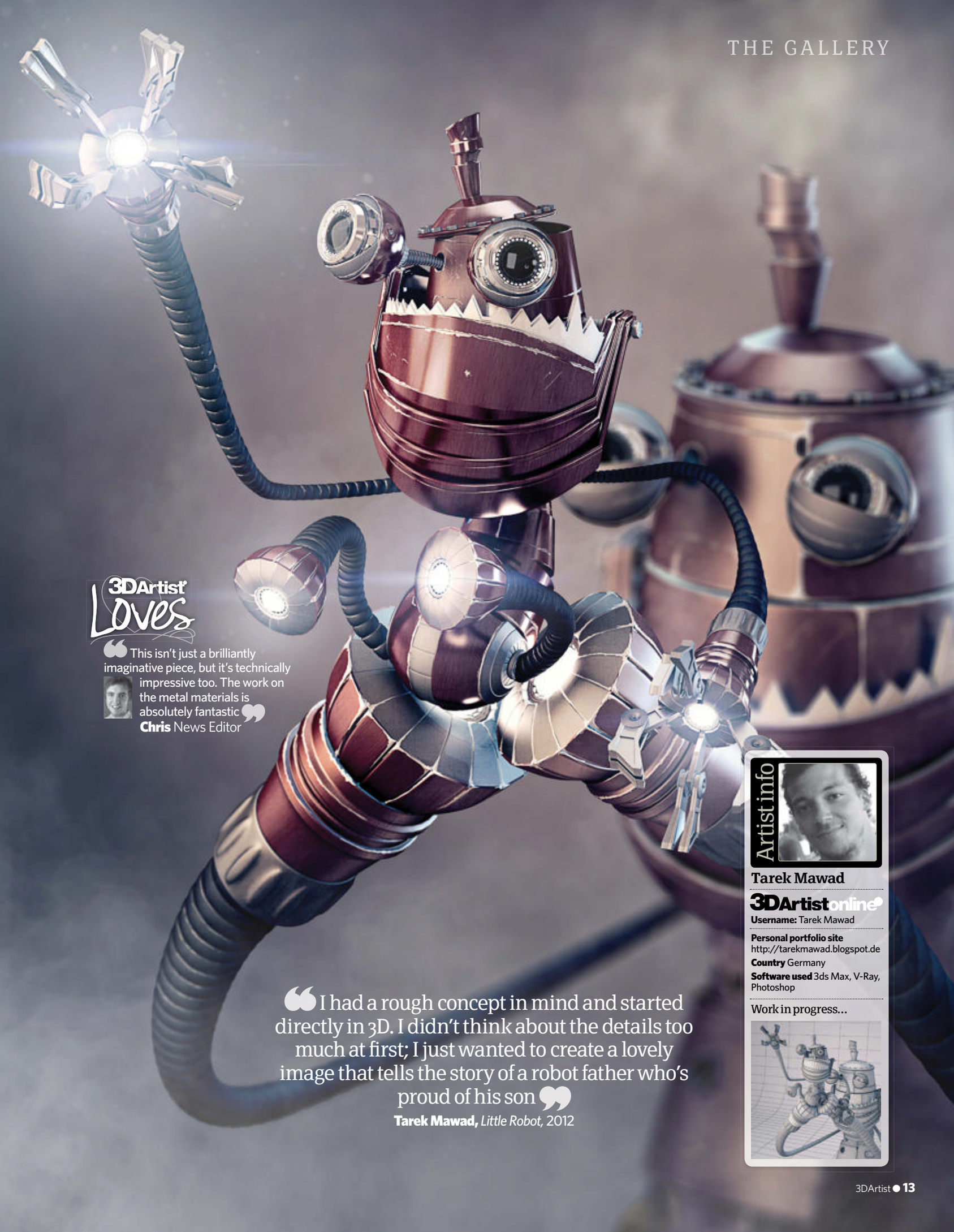
"I came across a concept by artist Fabrice Backès by chance. His strange female portrait grabbed my attention. It emanated a force, a new look that I'd never seen! I decided to pay homage to it in 3D"

Pascal Ackermann, *Fille Fleur,* 2013

3DArtist Loves

"This is certainly a striking image. It captures the essence of Fabrice Backès' original creation thanks to some incredibly accomplished shader work"

Chris News Editor



3DArtist Loves

This isn't just a brilliantly imaginative piece, but it's technically impressive too. The work on the metal materials is absolutely fantastic

Chris News Editor

> I had a rough concept in mind and started directly in 3D. I didn't think about the details too much at first; I just wanted to create a lovely image that tells the story of a robot father who's proud of his son
>
> **Tarek Mawad,** *Little Robot,* 2012

Artist info

Tarek Mawad

3DArtist online

Username: Tarek Mawad

Personal portfolio site
http://tarekmawad.blogspot.de

Country Germany

Software used 3ds Max, V-Ray, Photoshop

Work in progress...

“I was browsing a gallery when I saw an interesting character design by Xavier Houssin. I asked his permission to turn it into a 3D version. He was pleased with my proposal and agreed to it”

Philip Herman, *The Pirate Shark,* 2013

3DArtist Loves

“This character's striking eyes really stand out! Excellent lighting and post-production techniques certainly make it an image to remember”

Chris News Editor

Artist info

Philip Herman

3DArtist online

Username: Philip Vampire

Personal portfolio site
www.philip-art.com

Country Singapore

Software used Maya, 3ds Max, ZBrush, Photoshop

Work in progress...

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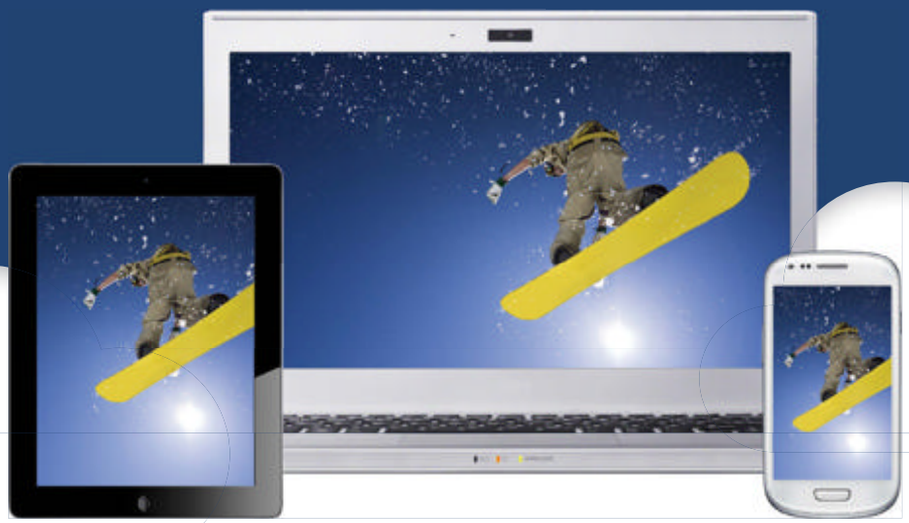

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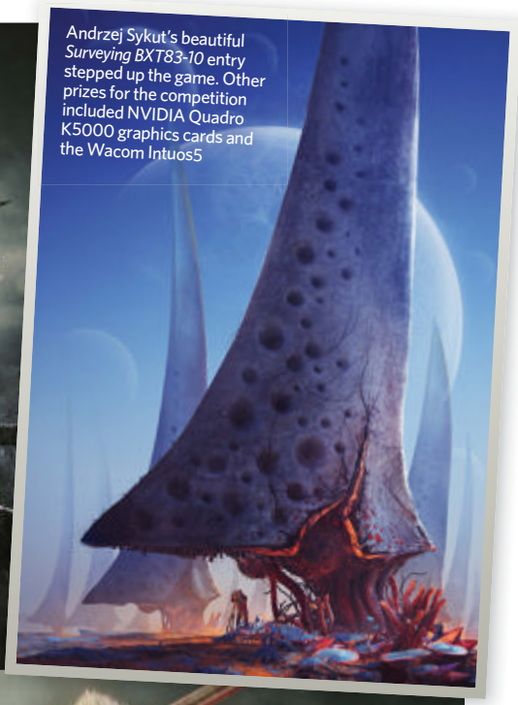
The competition comprised of ten categories for artists to enter. Jaroslav Čermák's *The Legend about TEN crows* is just one of the competition finalists



Andrzej Sykut's beautiful *Surveying BXT83-10* entry stepped up the game. Other prizes for the competition included NVIDIA Quadro K5000 graphics cards and the Wacom Intuos5

CGChallenge XXVII: TEN

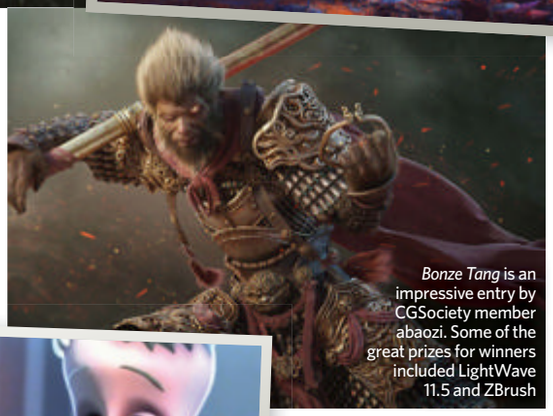
CGSociety's latest CGChallenge celebrates its tenth year online

CGSociety has come a long way since its inception. Born in a small room in Montreal, it began life as CGTalk/CGNetworks on 9 December 2001. Back then it was a simple forum for artists to chew the fat over the latest film releases and cool works of art. Now it's a mammoth endeavour – arguably the nexus of the CG community – where artists can learn, create and share.

"CGSociety has expanded and grown out of sight," says site editor Paul Hellard. "We offer news, feature articles covering the depths of movie and game productions, a CGJobs board, an active forum with threads for all kinds of discussion, as well as CGWorkshops covering skills required in the industry today."

CGSociety has also continued to run its famous CGChallenges over the years, with its most recent – the 27th – being set up to celebrate the end of the website's tenth year online. "As part of the celebrations we challenged artists to incorporate the number, idea, word or symbol of 'Ten' into an image or video, whether literally or symbolically.

"We wanted to keep a theme that was as open as possible, with latitude for all kinds of interpretation and humour. This could include a child counting to ten for the first time; a play on words; the Ten Commandments; ten minutes to save the world; remembering when you were ten; what happened ten years ago; the power of ten [and so on]. We aimed this at everyone."



Bonze Tang is an impressive entry by CGSociety member abaozi. Some of the great prizes for winners included LightWave 11.5 and ZBrush

'Birthdeus X' is a video entry from team Supersocks – the fruit of two months of labour for the CGChallenge

Winning entries were selected by a judging panel consisting of such artists as Pascal Blanché, Lorne Lanning and Alexander Preuss. One of the most popular entries was 'Birthdeus X' (a still of which can be seen above) from team Supersocks. "For me this entry shows everything that is good about CGChallenges," says CGarchitect CEO Jeff Mottle. "It's not only technically brilliant – with great modelling, great pace in the animation and brilliant lighting – but it's also the spirit that's behind it."

> "CGSociety has expanded and grown out of sight"
>
> **Paul Hellard,** CGSociety

Blast from the past

A brief history of CGSociety.org

CGSociety has grown a great deal over the last decade. It was first established as an online forum and news network in the early noughties, which later gathered under the business name of Ballistic Media in 2002. At this time the community wanted to see a compendium of its digital art and as such the company's first foray into print, *EXPOSÉ 1*, was released in 2003. It was in 2005 that the conglomerate of websites formerly known as CGNetworks all merged into **www.cgsociety.org**.

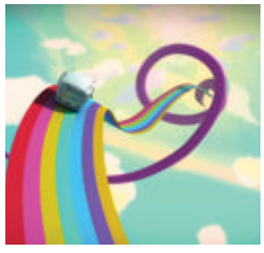
The winners

We round up comments from some of the CGChallenge XXVII: TEN winners...

Title: 'The Number of Blues'
Artist: Martin Kohler
Category: Visual Effects
"We were in production for our short film when CGChallenge XXVII: TEN came up, but we really wanted to take part. We made a plan and managed to finish every shot for the trailer."

Title: *Drunk Aliens*
Artist: Rafael Vallaperde
Category: Modelling
"This image was created in two months, working on a second shift after work. There are many things I'd like to keep working on, but at some point you've just got to call it 'done'."

Title: 'No.10 Bus'
Team: ArtistAfterWork
Category: Video Excellence
"This was not an easy journey. Every one of us has a very heavy load at our daily jobs and some of us even had to look after children while taking part in the challenge after work."



Artist spotlight

Industry insights

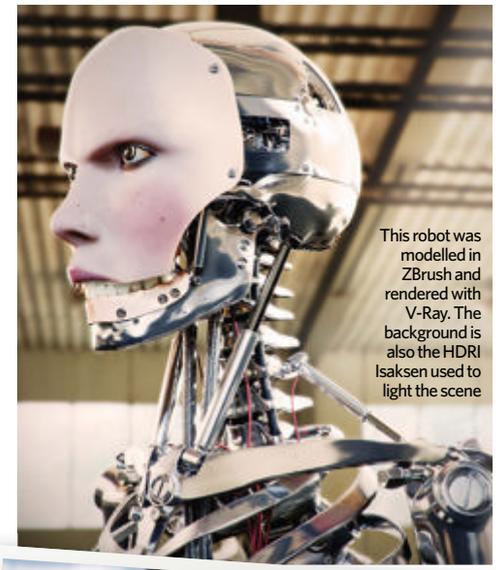
Tom Isaksen discusses taking the first step into the challenging realm of videogames

Tom Isaksen www.characterink.com

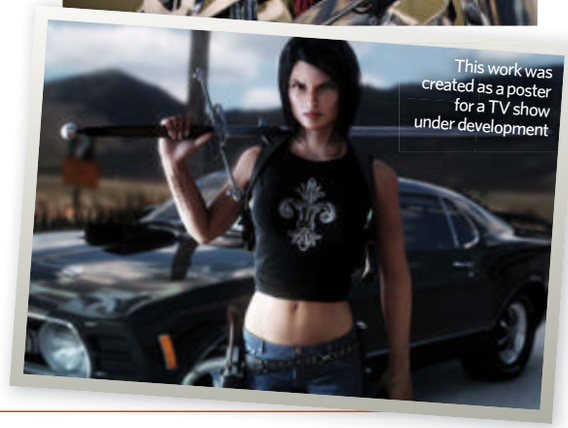
Originally from Denmark, Tom Isaksen got serious about CG in 2000 when he quit his regular job and took up a Computer Animation degree at Bournemouth University. His newfound passion eventually led him to IO Interactive, where he held the role of lead character artist on videogames *Hitman: Blood Money* and the recent *Hitman: Absolution*. Recently, however, he moved to Brazil to pursue a freelance career.

"As a freelance artist I have been doing a little bit of everything that's 3D-related, from videogames to print and advertising," he tells us. "*Hitman* was a challenging project, as I spent several years so deeply involved in those games. [However], even more challenging were some of the freelance jobs where I've had to learn something completely new, on tight deadlines, to get the job done!"

When it comes to landing a videogame job, though, Isaksen's advice is simple: "If you want to get involved in the industry, choose a popular 3D package and just start to explore the software," he says. "There is a steep learning curve so you need a lot of patience. Start basic and keep projects very small. Create simple objects, paint, render and animate. As you get better, keep challenging yourself and slowly start to specialise. Create what you love the most, but most importantly work hard and keep trying."



This robot was modelled in ZBrush and rendered with V-Ray. The background is also the HDRI Isaksen used to light the scene



This work was created as a poster for a TV show under development

3D Sketchbook

Speed sculpting

Adam Fisher explains how he pushes his speed-sculpting skills to the limits

Adam Fisher www.afisher.com.au

The ability to quickly sculpt high-quality images in ZBrush is a must-have talent for those looking to get into the videogame or movie industries. When working in a studio, assets need to be produced rapidly, so it's a useful skill to develop.

Freelance artist Adam Fisher created the images you see here – including Lord Pendleton from Arkane Studios' *Dishonored* – in under six hours, with two hours spent on PolyPainting and cleanup work. "Speed sculpting is great for getting design ideas down quickly," he says. "It allows you to explore designs and helps you become more efficient at sculpting overall."

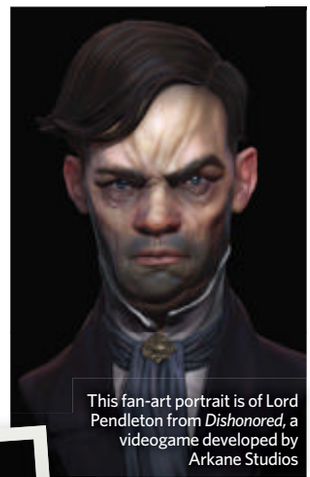
Fisher is capable of creating rougher sketches in around one or two hours, while more refined sculpts (such as those seen here) can take up to five hours.

"DynaMesh in ZBrush is brilliant for speed sculpting," says Fisher. "I can just start with a sphere and I'm able to pull out any shape I want without having to worry about topology. I also use masking and Mesh Extraction to create clothes and accessories..."

See a timelapse creation of the *Lord Pendleton* piece at http://tinyurl.com/3DALordPendleton.

Fisher offers his tips for high-speed sculpting

"When starting a sculpt, I work on getting the proportions, major shapes and the silhouette looking correct before moving to smaller details. I try to keep my DynaMesh resolution low at the beginning while I'm blocking in the main shapes. As I progress I'll begin dropping back down into a lower subdivision. This means I can make easier overall mesh changes, if needed."



This fan-art portrait is of Lord Pendleton from *Dishonored*, a videogame developed by Arkane Studios

Although Fisher can sculpt incredibly quickly, he stresses that getting a sculpt to look right is more important than how fast you can create it

The 3D Artist CG Student Awards

3D Artist magazine partners with the CG Student Awards for an exciting 2013

The newly named 3D Artist CG Student Awards is preparing for a thrilling 2013, with submissions already pouring in for this year's judging. "This year is huge for us," says awards founder Andrew McDonald. "Not only do we have a new naming rights partner – 3D Artist – but we're really excited to open up the playing field to include a dedicated Next-Gen Games category. To top it off, we have over $150,000 US in prizes up for grabs, with $100,000 US awarded to winners and finalists and $50,000 US directly to the School of the Year... We can't wait to see the calibre of entries submitted." For more information and to submit an entry, visit www.cgstudentawards.com.

inspiration corner

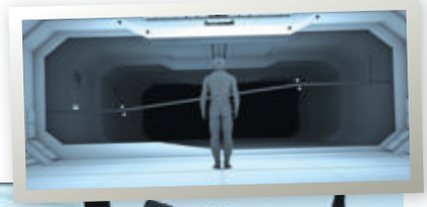
Going sci-fi with CINEMA 4D

Georg Fasswald describes the flexible nature of his latest film

Georg Fasswald www.zwupp.at

Created by Austrian artist Georg Fasswald, 'Why Are We Not Home Yet' is an abstract and atmospheric short that features some beautifully conceived sci-fi imagery. "I was inspired by all of the big names of the sci-fi genre," Fasswald explains. "My main intention of this piece, however, was to incorporate as many 3D techniques as possible. I had a core focus on hard-surface modelling to help improve my skills and overall understanding of 3D animation.

"A lot of the design occurred on the fly with hardly any prior concept work," he continues. "Due to limited resources it was key to keep the render settings as low as possible in order to enable a continuous workflow."



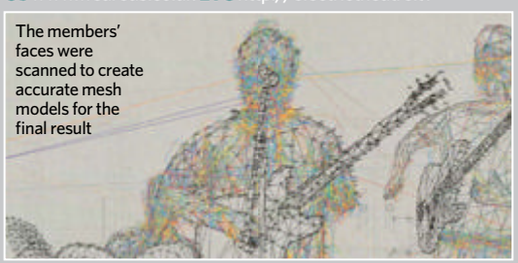
Fasswald did all of his modelling and animation in CINEMA 4D and all post work in After Effects

project focus

Joining the dots

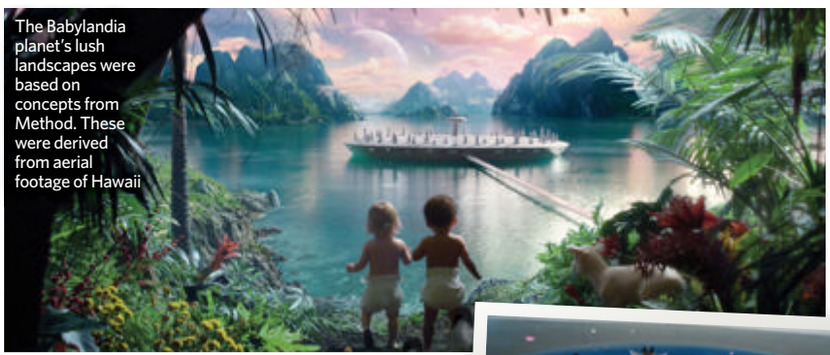
Creative companies bring mocap magic to a music video for the Foals

Us www.weareus.co.uk **ETC** http://electrictheatre.tv



The members' faces were scanned to create accurate mesh models for the final result

London-based creative studio, Us, consists of bright talents Christopher Barrett and Luke Taylor. Together, they embarked on a mission to create a dot-to-dot world for the Foals. "We spoke to ETC (http://electrictheatre.tv), which suggested the best way would be to have mocap footage of the band," says Taylor. ETC recorded the band's performance at Andy Serkis' The Imaginarium studio, imported the data into Maya and created a mesh for each member. "We imported a geometric cache of the band into Houdini and randomised the mesh topology," adds ETC. "We placed dots and numbers on each vertex and animated the lines flowing between the vertices on the models. Rendering was done in Mantra – and a few tricks in NUKE to give the look its textured, pencil-like feel."



The Babylandia planet's lush landscapes were based on concepts from Method. These were derived from aerial footage of Hawaii

behind the scenes

Super Bowl spot

Method Studios discusses its work on the imaginative 'Space Babies' ad

Method Studios www.methodstudios.com

The rapid workflow for 'Space Babies' enabled instant feedback from the client

Where do babies come from? It's an awkward question for any parent to answer. In this Super Bowl short created for Kia, a father has an original answer: another planet.

"The best thing about 'Space Babies' was that the work was well executed across many disciplines," says Method Studios' VFX supervisor Andy Boyd. "It was a huge collaboration between departments."

A creature team created over ten types of CG animals and customised spacesuits, while hard-surface CG work was undertaken to create the short's rocket ships, launch pad and enormous baby statues. "The overall aesthetic had to be gentle, like a Fisher Price toy," says CG supervisor Charles Abou Aad. The shader team used bright, baby-friendly materials rather than harsh metallic surfaces.

The film was composited in NUKE, with the compositors breaking each piece of the film into sequences. "Each sequence has its own stylised look that had to be linked throughout the story to get us from A to B," adds NUKE artist Patrick Ferguson.

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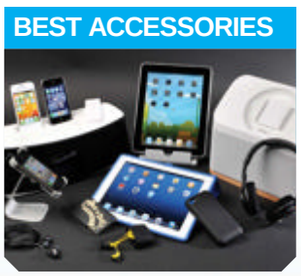

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3D-printed Moon base

Foster + Partners designs lunar structures with the ESA

Foster + Partners, a London-based architectural practice, is part of a consortium exploring the possibilities of using 3D printing to construct lunar habitations. Addressing the challenges of transporting materials to the Moon, the study is investigating the use of lunar soil, known as regolith, as building material. The practice has designed a lunar base to house four people, which can offer protection from meteorites, gamma radiation and temperature fluctuations.

Transported by rocket, the base unfolds from a tubular module, then an inflatable dome extends from one end to provide a support structure for construction. Layers of regolith are built up over the dome by a robot-operated 3D printer to create a protective shell. To ensure strength while keeping the amount of binding ink to a minimum, the shell is made up of a hollow, closed, cellular structure similar to foam. As part of the study Monolite UK supplied a D-Shape printer and developed simulated lunar soil to create a 1.5-ton mockup.

The outpost is designed as a modular system that can be extended in the future

Magic arms help children

U.S. researchers pioneer a 3D-printed robotic exoskeleton for disabled children

The Wilmington Robotic Exoskeleton (WREX) is an assisting device of hinged metal bars and resistance bands. It enables children with underdeveloped arms to play, feed themselves and hug. Tariq Rahman and Whitney Sample of Nemours/Alfred I. duPont Hospital for Children, worked to make the wheelchair-based device smaller to serve younger patients. Aiming to help two-year-old Emma Lavelle, who suffers from arthrogryposis multiplex congenita (AMC), they developed a lighter, vest-mounted WREX in ABS plastic on a Stratasys Dimension 3D Printer. While working on the device, the team devise concepts in CAD and build them the same day, meaning fifteen children now use custom 3D-printed WREX devices.

Emma Lavelle sports the WREX, which was nominated for the Design Museum's Designs of the Year 2013 awards

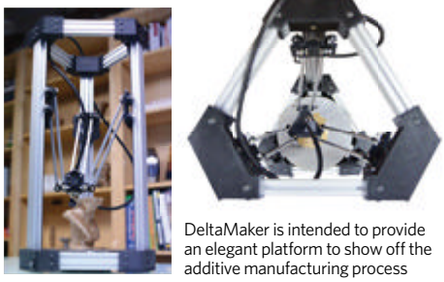
Haute Couture fashion printing

3D-printed clothing graces the Paris Fashion Week catwalks

Iris van Herpen's eleven-piece 'Voltage' collection featured two 3D-printed ensembles, including an elaborate skirt and cape created with Professor Neri Oxman from MIT's Media Lab. The 3D-printed skirt and cape were produced using Stratasys' Objet Connex, multi-material, 3D-printing technology.

"The ability to vary softness and elasticity inspired us to design a second skin for the body, acting as armour-in-motion," explained Oxman. "In this way we were able to design not only the garment's form but also its motion." An intricate dress was also designed in collaboration with Austrian architect Julia Koerner and printed by Materialise.

3D outfit in Objet Connex multi-material, from Iris van Herpen's 'Voltage' collection


DeltaMaker is intended to provide an elegant platform to show off the additive manufacturing process

Crowd-funded printing innovation

DeltaMaker is an elegant three-armed delta 3D printer

Launched on Kickstarter on 24 January 2013, DeltaMaker's development project reached its funding target by early February. The $1,999 US production version will use fused filament fabrication (FFF) to print, as well as both ABS and PLA at 100 micron layer resolution. No motor is specifically tied to a single axis – by moving three sets of parallel arms, the DeltaMaker can precisely position the extrusion head in 3D space. As well as drawing on open-source technology for part of the DeltaMaker prototype, the team used some projects they backed on Kickstarter.

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Image of the month

Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

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A Southern Ground Hornbill
» **Leandre Hounnake**
3DA username HLeandre
Leandre says: "The Southern Ground Hornbill is a large bird that's around 90 to 129cm tall and found in Africa. This was created in 3ds Max and Mudbox then rendered with V-Ray."
We say: *This picture-perfect image stands out from the crowd with its incredible detail and thoughtful framing. Notice the intricate patterns around the eye and the smooth finish of the beak. We're convinced this remarkable feat could fool a fair few eyes!*

B Butterfly Gun
» **Davide Franceschini**
3DA username kresta
Davide says: "To make this image in 3D I was inspired by a drawing by Sam Flores (*Butterfly Gun*). Sam is an American visual artist, illustrator and muralist, creating primarily urban and graffiti-inspired modern art."
We say: *Another exceptional image that takes a truly unique spin on reality. Certainly, this is a laudable interpretation of the original drawing. The stylisation and muted colour palette give a somewhat disturbing quality to this beautifully rendered image.*

C Alien
» **Thomas Lishman**
3DA username Thomas
Thomas says: "Sculpted and rendered in ZBrush and composited in Photoshop, this was a short, fun project created while trying to come up with an interesting character in under 40 minutes."
We say: *The lighting of this ZBrush character really helps add mood to the expression. He looks like an evil genius! His pout is pretty awesome, too.*

D A contrast between two worlds | MoM
» **Rodrigo Sória**
3DA username Rodrigo Sória
Rodrigo says: "Developing this image gave me great satisfaction because I wanted to develop a different atmosphere. [I also wanted to] create an imaginary world that was playful, with a mystical character but the feel of real life."
We say: *Absolutely brilliant! We love that a quick close-up inspection of an image takes what you think you know into a land where bugs have their very own tattooists.*

Silver House Exterior

» **Jacinto Monteiro**

3DA username MetroCubico

Jacinto says: "A single vacation house located near the sea on West Cliff, Southgate, UK, in the heart of the Gower Peninsula. It was created with 3ds Max and V-Ray. Photoshop was used for glows, with Levels and Color Balance adjustments."

We say: *We love the strong composition of this arch-vis piece, framed with a stormy (British) sky to really set the mood and enhance the environment that surrounds it.*

Elephant

» **Timothy J. Reynolds**

3DA username Turnislefthome

Timothy says: "These renders are from my self-initiated 'Isometrics' series where I make little low-poly worlds."

We say: *The simplicity of this model is made beautiful by colour and lighting choices that enhance the model and bring its asymmetrical pose to life.*

Buick Streamliner

» **Adrian Tiba**

3DA username adit1001

Adrian says: "I created the Buick Streamliner vehicle in 3ds Max, and for the rendering I used V-Ray"

We say: *This back-end shot gives a fantastically extravagant view of this luxurious car, with the studio lighting kept simple to highlight the sexy curves.*

Future Soldier

» **Adam Sacco**

3DA username Soulty

Adam says: "I completed the character's design, modelling, textures and shaders ready for [any potential] animation."

We say: *This atmospheric shot cleverly gives insight into the character's purpose. His strong posture gives him a real not-to-be-messed-with quality too.*

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You tell us

Did you see Media Molecule showcasing its motion-controlled 3D-sculpting tech at the PS4 reveal? If not, then you should do so right now: http://youtu.be/H6tgJRRZurk

Facebook.com/3DArtistMagazine

Ângelo Vil Phernandes It's like ZBrush with PS Move. This has gigantic potential.

John Wendels I expect to get very involved in this.

So, the Oscars happened. And so did this: www.fxguide.com/quicktakes/visualeffectsprotestatoscars. We want to know what you're feeling today.

Facebook.com/3DArtistMagazine

Kurt Papstein Unpaid artists, overtime hours (also unpaid) and bankrupt studios. And Mr. Lee wants it to be "cheaper" - http://tinyurl.com/a4lpntb.

As an artist, it hurts. This is not just our livelihood, but the sum of a lifetime of dedication, learning and skill to get there.

@3DArtist

@AlmostHobbles: Didn't watch it... I had a feeling, though, that the protest would be brought up. Or there would be an attempt at bringing it up.

@CityFolgers: The VFX industry needs to change...

Star letter

digital-tutors

www.digital-tutors.com is a learning resource site boasting a library of over 20,000 video-based CG lessons

THE AUTHOR OF THIS ISSUE'S STAR LETTER WINS A MONTH'S FREE SUBSCRIPTION TO DIGITAL-TUTORS WORTH $45

Every issue of **3D Artist** magazine showcases top artists from around the world alongside those artists climbing the ladder themselves. Be sure to register a gallery on 3DArtistOnline.com

Big respect

Hello, my name is Shane and I am from South Africa. I am 19 and currently studying Civil Engineering – with an artistic mind. You may ask what this has to do with you? Well, my girlfriend (Shannon) is studying 3D Animation, [so we] went to a mall where we viewed your magazine. We were extremely impressed and astonished by how excited we were as we scanned through the magazine, expressing 'Oh wow, no way!' and 'That is so cool, I wish I could do that!'...

I would just like to express how fascinated I was with your magazine and would like to pay my respects to all the people involved in the making of the magazine: you all have the most exciting job in the world! We both envy you all. Thank you all for creating such an inspirational magazine that has excited Shannon for the day that she graduates and gets to show her work in the same way you all proudly do.

Shane, from his BlackBerry

What a fantastic letter, thanks Shane! We have selected you as our Star Letter so we can award your lovely girlfriend, Shannon, with a month of free access to the incredible Digital-Tutors training website. There she'll be able to add to the excitement by filling her boots with tips and techniques to help with her studies. We hope she enjoys it!

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Joe, by email

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Going digital

Hello, I live in the USA and have been reading the print version of 3D Artist for quite some time. I really appreciate the disc that's included with it. In fact, I was overjoyed with issue 50 as it included Vue 10 Frontier and a host of content.

I am currently considering moving all of my magazine subscriptions to Zinio. My question is: if I subscribe to 3D Artist via Zinio, is there any way to get all of the same resources via download that I would have gotten via the disc? For example, could I download Vue 10, the 50 free models, the 50 free textures and so on?

Wayne, by email

Digital subscribers don't currently get access to the full disc content, as we need to protect our content suppliers. In the meantime, if you like the discs, we'd recommend sticking with a print subscription. If you still want to go digital you can access the magazine's tutorial files here: ***www.3dartistonline.com/files.***

This issue's disc gives you access to exclusive software trials, pro models and an HDRI, over three hours of video training and all of our magazine tutorial files. Anyone can download these tutorial files through the 3D Artist website

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BEHIND THE SCENES: BIOSHOCK INFINITE

Chris McMahon talks to the team at Irrational Games to find out how they created a steampunk city beyond the clouds...

Behind the scenes: BioShock Infinite

> Our story is so complex that we honestly could not afford to waste our visual space this time
>
> **Scott Sinclair,** art director

Six years ago a plane crashed into the ink-black depths of the Atlantic. A lone passenger emerged from that wreckage, fighting through the burning debris on the ocean's surface and towards a solitary lighthouse, towering in the nocturnal gloom.

That lighthouse, silently beckoning from the dark, was the entrance to the underwater dystopia Rapture – the setting for 2007's seminal shooter *BioShock* and one of the most immersive videogame environments ever committed to silicon.

BioShock's spiritual sequel doesn't open all that differently. Once again the scene fades in on an open ocean, and the player makes their slow approach to a lighthouse obscured by a grey sea mist. The place this lighthouse eventually leads to isn't so dissimilar either – it's another unique and never-before-seen videogame environment, hidden away from the prying eyes of society.

The one difference, however, is big. Rather than send you to the depths of a city submerged many fathoms under the sea, *BioShock Infinite*'s lighthouse shepherds you upwards, around its spiralling staircase towards a rocket that blasts you as far from Rapture as humanly possible, directly towards the heavens. Well, perhaps not that far, but as close as the creators of Columbia could manage.

Named after the female personification of the United States, your destination is a city in the sky, held aloft by a complex arrangement of rockets, propellers and hot air (in more ways than one). Where Rapture was a slowly corroding sub-aquatic rust bucket, creaking and groaning as it burst at the seams, Columbia is a shining pinnacle of human endeavour. The fairytale landscape features towers, spires and majestic statues that stand proud against a blue sky, ribboned in streaks of red and gold.

It's here that *BioShock Infinite* takes place, an echo of its predecessor in environment, narrative and gameplay design, but altogether separate in terms of execution. No expense has been spared in the creation of Columbia, a brave new world for players to explore that promises to be every bit as immersive and narratively rich as Rapture, if not more so.

"Every detail, down to the labels on our static shelf-filler, have been designed to interact with the overarching narrative in some way," says art director Scott Sinclair, musing on the epic endeavour he and his team have brought to successful completion. "Our story is so complex that we honestly could not afford to waste our visual space this time."

Read on to enter the fascinating world of Columbia. If you're afraid of heights, don't look down!

Location Massachusetts, USA
Portfolio highlights:
BioShock, 2007
SWAT 4, 2005
Tribes: Vengeance, 2004
Freedom Force, 2002
System Shock 2, 1999

Company history Irrational Games was founded in 1997 by three former employees of Looking Glass Studios – the developer of such respected titles as *System Shock* and *Thief: The Dark Project*. The Irrational Games team has released titles including *System Shock 2* and *SWAT 4* to critical acclaim, but discovered its first real success with 2007's *BioShock*. Under the leadership of creative director Ken Levine, the studio currently focuses on titles that aim to marry philosophical narrative with meaningful player choices for truly exquisite gameplay.

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BioShock Infinite is the spiritual successor to 2007's critically lauded *BioShock*. The themes are the same – a philosophically grounded narrative core, an intriguing location to explore and open-ended gameplay shaped by choice. But the story is completely new. You are Booker DeWitt, sent to the floating dystopia of Columbia to retrieve Elizabeth. All, however, is not quite as it may seem...

Behind the scenes: BioShock Infinite

By animating background structures with a slight bobbing motion, the team created the sensation that the player is always high up off the ground

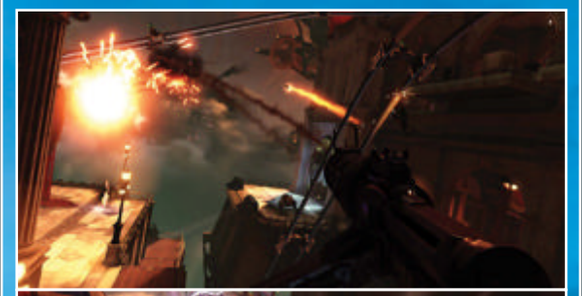
Columbia may sit proudly above the clouds, but it won't necessarily stay there. Expect some truly stunning sequences of its downfall

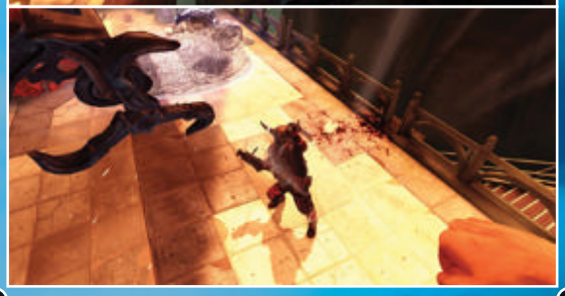
ON-RAILS GAMEPLAY

Why BioShock Infinite is a literal roller-coaster ride, as well as a figurative one

One of Columbia's most interesting features is its Sky-Lines: snaking, golden rails that twist, turn and dip through the towering architecture. Players can attach to these Sky-Lines using the Sky-Hook, enabling them to reach previously inaccessible heights, or – in some of the most spectacular moments – dropping from one rail and attaching to another in an exhilarating few seconds of free-fall.

"One of the greatest challenges of all was working out how to incorporate these Sky-Lines," says environment artist Jamie McNulty. "Our budgets were squeezed to the very last drop in order to create any space that had a Sky-Line. These needed large areas to be able to create the ups and downs required in a roller-coaster-type experience. However, we still needed more architecture, more floor space, more nick-knacks on the ground and more people in the scenes so that it never felt sparse. It was a very tough balance."





ONE NATION OVER GOD

The man who finds his way to this city in the sky is Booker DeWitt – an ex-Pinkerton agent sent to find and retrieve a mysterious woman locked away in one of Columbia's many distant towers. The city is, simply put, gaming's greatest environmental achievement since Rapture. Developer Irrational Games spared no expense when it came to delivering something players had never seen before.

"I think Columbia is so layered and dense, I'd need to spend time reverse-engineering a core example to state what its aesthetic is in a sentence," says Sinclair of the 1912 setting. "The quick answer is that Columbia is a massive stew of references. Some of the key research came from sources like *Hello, Dolly!*, *Gangs of New York*, Main Street (USA), *Moulin Rouge*, the 1900 Paris World Expo, the documentary *America 1900*, *Boardwalk Empire*, as well as a handful of websites like **www.shorpy.com**."

Columbia is attractive, but also functional, intended to feel like a real place that people could inhabit – despite its irregular location. "We never want players to reach a point where the world is familiar and just fades into the background," says Sinclair. "Columbia was conceived with the foundation of a believable cityscape, without sacrificing the fantasy elements."

Irrational built levels by first blocking out space and then adjusting it to suit the needs that the design dictated. "From these block-outs we would make a couple of paint-overs in each level to work out what the buildings would look like," explains environment artist Jamie McNulty. "These shots then got re-drawn into architectural template swatches that would inform the components to make up our buildings.

"We modelled the sections of these buildings in 3ds Max, applied them to a procedural building rule set, and worked out all of the kinks within the rules. Each building face could be set to have closed storefronts, open storefront bottoms, walls that tile windows, flat bricks and so on. We then started replacing any of our general block-out geometry with these procedural buildings to dress up the space.

"However, once we had the buildings and the general décor prepared, it still felt like something was missing," McNulty

BioShock Infinite's art style is incredibly distinctive, evoking a range of fashions and designs from the early 20th Century

> Columbia is so layered and dense… [it] is a massive stew of references [from] *Gangs of New York, Moulin Rouge* [and] *Boardwalk Empire*
>
> **Scott Sinclair,** art director

continues. "It was a detailed terrain mesh. Using hand-crafted, zone-per-zone terrain meshes gave us the ability to tailor cobblestone walkways, roads, sidewalks, fancy patterns on the ground and so on. We finished our environments by painting vertexes on the terrains to provide texture variations like dirt, water or grass. These meshes helped to make the place sing."

Creating a beautiful façade for the city was one thing, but convincing the player that it's all set thousands of feet from terra firma was another. "Seeing open air and reminding players of the possibility of falling off the edge was a must," says McNulty. "You can get caught up making tight alleys or creating streets with rows of buildings on each side, but without the open air it would have felt like a regular old street on the ground. With Columbia we almost always have one side of the street open to the sky.

"Once we realised how much sky we needed to show, it became a technical challenge to be able to draw the vistas and the views into the distance that opening up the streets created," he recalls. "It's not just opening up a spot, it's also building the foliage [and] the world's edging."

There was also the question of creating the sensation, not just the view, of being on a floating city. "Our amazing programmers created Floating World tech for us to use," explains McNulty. "It allowed us to parent multiple objects in Unreal to a single node. We could animate that node to move, bob and sway as we saw fit. This meant we could build with hundreds of meshes and just move them as a group."

"Our passion for making quality visuals drove what we did, not the tools or tech," says Jamie McNulty. "Give me passion over fancy gizmos any day"

"Our goal was to create tonal contrast and broad themes introduced within the capsule of a single city," says art director Scott Sinclair

Behind the scenes: BioShock Infinite

BioShock Infinite artists reveal how to design and create a game character
page 52

> Considering that Elizabeth is the soul of the game… we were able to spend more resources on her than your average asset
>
> **Gavin Goulden,** lead character artist

Elizabeth is coveted for her special ability to manipulate tears in dimensional space time, revealing events that haven't even happened yet

The relationship formed between Booker and Elizabeth is integral to the game's narrative. As such, a great deal of time was given to ensuring her facial animation was effectively emotive

The animation of enemy NPCs is impressive; for example, the mechanical lurches of the Motorised Patriot or the extremities of the Handymen

ANIMATING ELIZABETH

In all its feminine grace, Columbia is almost as much of a character as it is an actual environment. Nevertheless, it still takes second billing to *BioShock Infinite*'s imprisoned princess Elizabeth.

Perhaps one of the most considered companion AI designs since *Half-Life 2*'s Alyx Vance, there's more to this damsel in distress than meets the eye. A striking woman with a shock of dark hair and huge blue eyes, Elizabeth has been kept in forced captivity for 15 years, but Booker has been sent to take her back to New York. However, not only do Columbia's warring factions covet Elizabeth, but her former guardian, Songbird, is determined to recapture her.

Elizabeth is central to the story and is front-and-centre throughout the experience, accompanying the player at all times. As such, getting her just right was key to *BioShock Infinite*'s success.

"Considering that Elizabeth is the soul of the game, unquestionably the main character of the project, we were able to spend more resources on her than your average asset," says lead character artist Gavin Goulden. "It was extremely important to get her right. She had a much higher budget than common characters you see in the world, and a lot more time was put into concepting and revising [her]. With everything added up – the different versions you see in game, the various takes on her face and hairstyles, the research time into not only her appearance but how she acts – the total amount of time spent creating Elizabeth was easily a few months."

All versions of Elizabeth were created in Softimage and then sculpted in ZBrush, with the low-poly model then converted to the

LEATHER HARNESS LIKE HORSE SADDLE
BRAIDED CABLES RUN ATTACH TO MECHANICAL WINGS
WORN BLACK LEATHER
BIG LEATHER STITCHES
HAND BALLED-UP TO USE CLAWS
*NOTE HE CAN USE HIS HANDS AS FINGERS clear the claw length
STRETCHED CANVAS OVER BRASS WING FRAME
wing elbow joint
GEARS FOR LOCKING WING POSITIONS

Being one of *BioShock Infinite*'s main characters, Songbird had a lot of concept time put into his creation. His eventual appearance didn't stray far from the original design, though

Animation department's 3ds Max and CAT plug-in pipeline. Creating likeable animation was pivotal to the character's success, given the relationship that forms between her and Booker throughout the game.

"The idea of a companion character was new to our studio and presented us with a series of challenges that we hadn't had to face previously," says lead artist Shawn Robertson. "We knew that we wanted a blend of mocap and keyframed animation for Elizabeth's body, so we would often use the mocap as a starting point and the push poses or timing as needed for the scene. As we had multiple animators working on Elizabeth for various scenes, having a single actress, Heather Gordon, doing her mocap throughout the game provided a level of consistency to the character."

Facial animation presented more of a challenge. "We weren't sure how we wanted to handle her facial animation," remembers Robertson. "Elizabeth's face was designed to be more expressive than actual human proportions, so when we added facial-capture data to it she didn't feel quite right. On a side-by-side test of an early Elizabeth model, comparing the facial capture and keyframe facial animation, it was no contest. The keyframed version was the clear winner.

"We used the rule of thumb that if a character were close enough to the camera, with just their face and chest on the screen, we would hand-key their face for the best possible quality," Robertson continues. "However, if they were further away from the camera we would generally rely on FaceFX. We spent a lot of time researching and manipulating FaceFX within Unreal to take care of smaller lines of dialogue and dynamic emotional reactions."

CREATING THE SONGBIRD

Shawn Robertson discusses the creation of BioShock Infinite's most unique character

Songbird is an interesting figure in *BioShock Infinite* for a range of reasons. A winged, 30-foot mechanical monstrosity, Songbird was created for the sole purpose of keeping Elizabeth in prison. However, during her 15-year incarceration he was also Elizabeth's only source of company, coming to be her caretaker, protector and even her friend. This strange captor/captive relationship plays a big part in how the narrative between Booker and Elizabeth develops. "The Songbird was a great character to work on," says Robertson. "He had to be both this intimidating creature that could crush your skull in a heartbeat, but at times elicit sympathy from the player."

STAGE 1:
"All great character designs start with a concept and the Songbird was no exception. One day Robb Waters, our creature concept artist, showed us this beautiful sketch of Elizabeth reaching up to touch a giant bird-like creature on the head, with the creature bending down to accept her touch. The contrast between his size and gentleness really spoke to us."

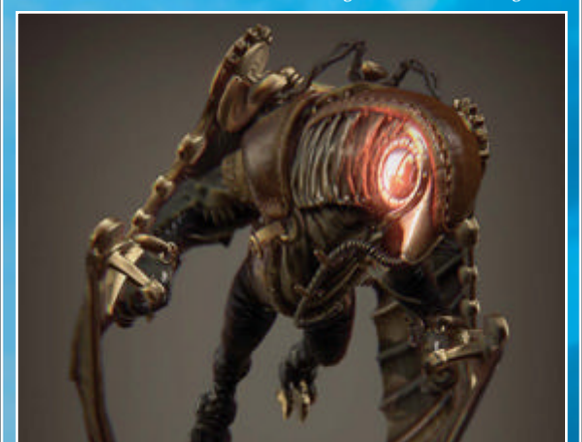
STAGE 2:
"Next we had to break that concept down into a construction sheet. Robb did tons of sketches, breaking the Songbird into separate parts that would show a modeller how to create a certain section. How does the shoulder move? What exact type of leather should the arm section be made out of? How does that hose fit into the coupling? All of these details got put onto paper to form a map for creating the Songbird in 3D."

STAGE 3:
"The modeller used these drawings to create the Songbird. We first modelled in ZBrush and got in all of the high-res details. Once the model was approved, we built the game-resolution model and baked all the details down to fit within our budgeted texture resolution and vertex count."

STAGE 4:
"The technical animators started planning out the rig of Songbird before the in-game model was completely finished. This way they could work with the modeller so corrections could be made to help out with the animation work."

STAGE 5:
"When the Songbird was modelled, textured and rigged, he was ready to animate. We merged Songbird with appropriate characters in a 3ds Max file and animated the scene."

STAGE 6:
"Once the animation was in-game, Songbird started to feel like the great creature he is, but he only truly came to life when we added effects and audio. These last steps brought the scene home and made us see Songbird as a real being."



Behind the scenes: BioShock Infinite

> The character pipeline for BioShock Infinite was based around 3ds Max, Photoshop and the Unreal Engine
>
> **Scott Sinclair,** art director

Other enemies not discussed here are the Boy Of Silence – whose funnel-like ear horns increase his ability to detect sneaky players – as well as the Siren, who can re-animate fallen corpses

CREATING CHARACTERS

Although Elizabeth is the narrative core of *BioShock Infinite*, around which all other characters orbit, there are nevertheless plenty more imaginative character designs to be found throughout the game.

"The character pipeline for *BioShock Infinite* was based around 3ds Max, Photoshop and the Unreal Engine," explains Goulden. "Outside of those core programs, individual artists were able to supplement their workflow with tools such as Softimage, xNormal and CrazyBump.

"Our pipeline is fairly standard when compared to other studios," he continues. "After collecting reference images, our concept artists take multiple passes on what the character may look like. We present these different takes... come to a decision on what the strongest candidate is and refine that to a more final piece. Once the concept is approved, our character team creates a base model and begins sculpting in ZBrush. After the sculpt is approved, the high-resolution models become the target for Normal and Shading maps. These are then applied to a lower-resolution model [at] around 10,000 triangles.

"Once our character is baked down, we create textures for our physically based materials within Unreal. These consist of a diffuse texture with minimal ambient occlusion baked in, a traditional specular texture, a gloss texture and a fresnel mask. We then skin our characters (usually to a shared skeleton) and import the character into the game."

The Handymen were designed as AI that would force the player to keep moving. They can perform long-distance jumps and melee attacks

While the technical process may not be a huge departure from that of most other videogame developers, the art direction itself is strides ahead of the competition. *BioShock Infinite* is not only filled with a menagerie of steampunk antagonists far removed from your usual soldiers and psychos, but the entire world feels like something completely unique. Much like it did with *BioShock* in 2007, Irrational Games is once again changing the rules with *BioShock Infinite*, introducing fresh narratives and brave new worlds.

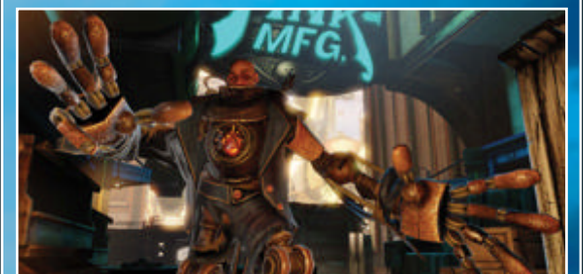
Who knows where the company will go from here. Considering the possibilities offered by the PlayStation 4 and the eventual successor to the Xbox 360, the team will have a lot of new tech to play with. Another lighthouse emerging from the dark, another city hidden from watchful eyes. The possibilities are truly infinite.

HISTORIC ENEMIES

We take a look at the character design behind some of Columbia's most terrifying enemies

"For the Motorised Patriot design we looked for a slow-but-tough AI that could throw a ton of lead downrange. We were fascinated by these [historical] automaton designs that attempted to re-create human features, but ended up not quite correct – basically the 1900's equivalent of the uncanny valley. Some of the designs that we saw were pretty creepy and just the right vibe that we were shooting for. The narrative of the deification of the Founding Fathers in Columbia fits perfectly with the idea of automatons. Who wouldn't want someone they admired brought back to life to walk among us? What could possibly go wrong?"

"The Handyman design's aesthetic also has roots in automaton designs, but the characters are actually still part human. The iron lung was invented a little after [the time period of *BioShock Infinite*], but the idea of keeping a human alive with a machine was an interesting theme. This is even more interesting if the machine were actually stronger than the original body that the person inhabited. The Handyman is essentially an iron lung of sorts that unfortunate souls stricken by diseases can use to stay alive. The attention that we spent on the porcelain hands to really bring out the skin tones that had cracked over time, evoked the name."



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> The character artist is at the centre of everything that happens in the process
>
> **Judd Simantov**

Environment artist Toni Bratincevic still creates a lot of personal work, but gaming is never far from his mind!
© Toni Bratincevic

GET A JOB IN THE GAMES INDUSTRY

It's artistic, technical, challenging, unconventional and one of the most exciting fields to work in. Here Poz Watson speaks to videogame artists from all stages of the pipeline

It takes a village to raise a child and it takes an awful lot of artists and programmers to create a playable videogame. Every different company has its own pipeline to achieve this goal, but there is a basic structure to making a videogame that anyone looking to get into the industry needs to understand.

First come the ideas and the concept art that bring these videogames to life. Then there are the characters and the environments to be modelled and textured. Next comes the rigging, which acts like a bridge, as it's "both an artistic and a technical process", as Judd Simantov (www.gc-academy.net) puts it. Finally everything has to be animated before the finishing touches, the VFX shots and the environment lighting to unite it all.

Simantov explains that the character artist is at the centre of everything that happens in the process: "The usual workflow would be for the concept artist to sketch a rough design, pass it along to a character artist who will build it and then pass it to the rigging department. Once that is finished, the character must be set up to work within the videogame and then passed off to an animator... At any time the character can be passed back to the artist for changes or bugs that might occur once it moves along the process."

However, this workflow is by no means an arbitrary conveyor belt. Senior character artist John Hayes explains that "creating highly polished in-game art can be complicated... New development tools that may have little or no interface are difficult to use and may require extra improvisation to get working".

MEET THE ARTISTS

Jonathan Avila
Job title: 3D animator/artist
Company: Freelance
Area of expertise: Creating, fixing and rigging character meshes ready for animation, modelling and texturing
Tools used: Maya, 3ds Max
www.javila3d.com

Julian Laing
Job title: Animator and VFX artist
Company: Freelance
Area of expertise: Character animation, VFX, rigging
Tools used: 3ds Max, MotionBuilder
www.julianlaing.com

Toni Bratincevic
Job title: Senior environment modeller
Company: Blizzard Entertainment
Area of expertise: Modelling and texturing for pre-rendered cinematics
Tools used: 3ds Max, Maya, ZBrush
www.interstation3d.com

Jamie Martin
Job title: Concept artist, designer, creative director
Company: Freelance
Area of expertise: Concept art, building GUIs
Tools used: CINEMA 4D, Photoshop
www.jamiemartindesign.co.uk

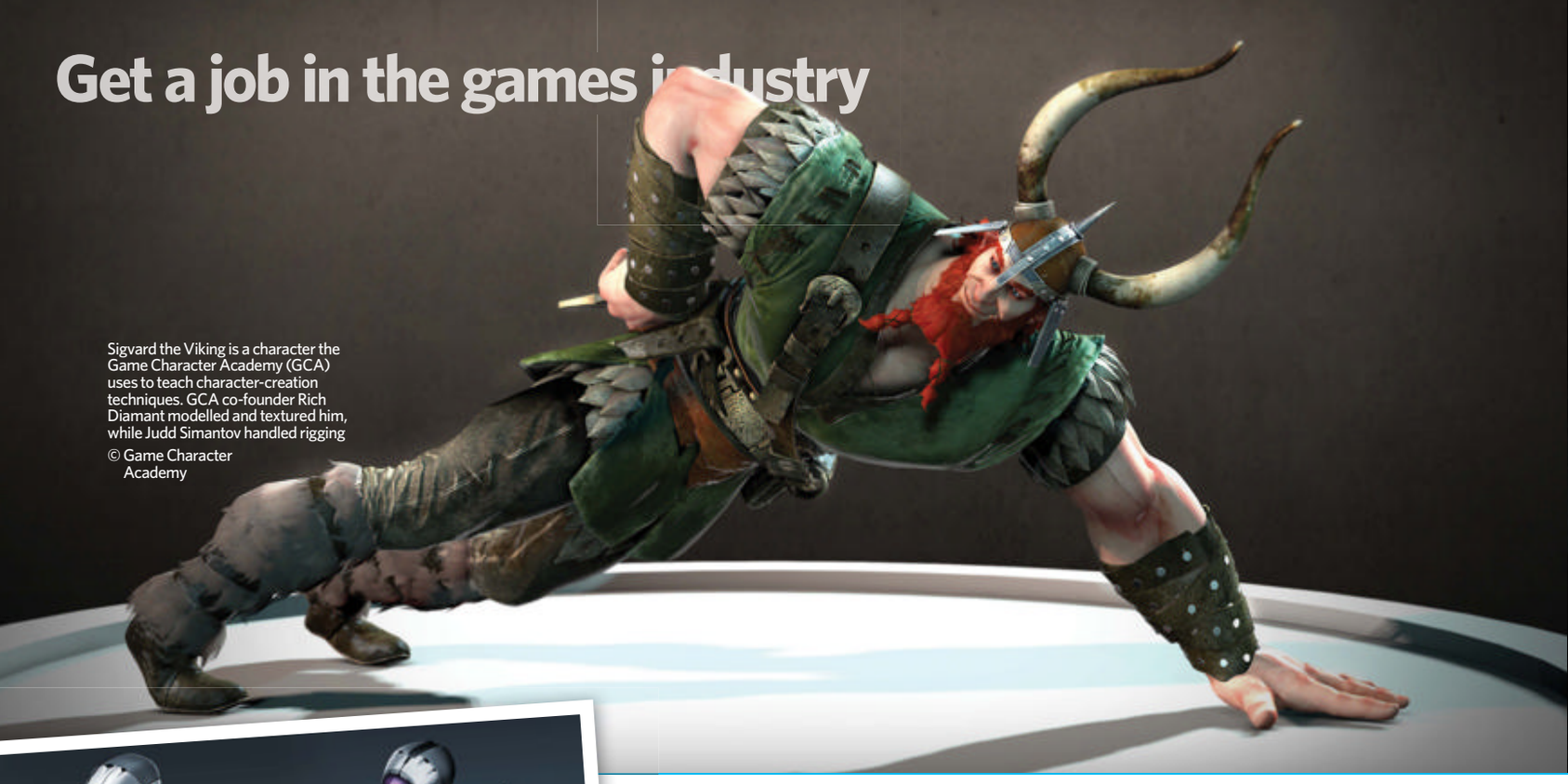
Mike Fortais
Job title: Technical artist
Company: Freelance
Area of expertise: Rigging, real-time technical integration, UV mapping, lighting and texturing
Tools used: Maya, Photoshop
www.mikefortais.net

Bonnie Rosenstein
Job title: Environment artist
Company: Electronic Arts
Area of expertise: Modelling props and levels and painting textures
Tools used: Maya, Frostbite, Photoshop
www.linkedin.com/in/bonnierosenstein

John Hayes
Job title: Senior character artist
Company: Sanzaru Games
Area of expertise: Modelling, texturing
Tools used: Maya, modo, ZBrush and Photoshop
www.john-hayes.cghub.com

Judd Simantov
Job title: Co-founder
Company: Game Character Academy (GCA)
Area of expertise: Rigging
Tools used: Maya, Mudbox, ZBrush and Photoshop
www.gc-academy.net

Get a job in the games industry



Sigvard the Viking is a character the Game Character Academy (GCA) uses to teach character-creation techniques. GCA co-founder Rich Diamant modelled and textured him, while Judd Simantov handled rigging

© Game Character Academy

Much of Jamie Martin's concept work is created in 2D, like these Pitgirl designs

© Jamie Martin

The GCA co-founders designed Sigvard so they could use him to teach their students how to create memorable characters

In the 3D world there's a lot of talk about the relative virtues of being a specialist or a generalist. The truth is, the company you work for and the projects you work on will probably determine this more than you or your skillset. Basically, the bigger the company, the more you will specialise. Jamie Martin has just started at a new company that has big ambitions, but is only just beginning to grow.

"At present I'm fulfilling two main roles," he explains. "First I establish various styles – and families of styles – for specific elements of the game that will help us build a visual design bible. [I also] assist with creating stories for some of these elements. Once specific styles are approved, I move to developing the designs of particular items that fall into those styles: creating 2D concept artwork and turning them into 3D models. Second, I'm developing the overall style of the game's GUI/HUD. Each of these different processes involves a lot of creative exploration..."

> The role of the character artist in videogames is one of the most sought-after jobs on the development team
>
> **Judd Simantov**

Martin's commitment to the scope of the project is typical in the world of videogames, particularly for the concept artists that kick it all off. "Working on a film is different in that it's generally a more short-term and focused affair," says Martin. "You're brought on as a freelancer typically for a shorter period of time. Working in the videogames industry (from my limited perspective) is more of a familial relationship. It's a longer-term project."

Once the concept art – everything from the main characters and the main locations to the smallest props – has been imagined and designed in 2D, the work is turned over to the character artists. "The role of the character artist in videogames is one of the most sought-after jobs on the development team," explains Simantov. As well as being a consulting technical artist, Simantov has co-founded the Game Character Academy with Rich Diamant to train people to create compelling characters. "Their responsibilities include background characters, non-playable characters who roam the world and main characters that become the face of the game's franchise. Those lucky enough to be tasked with designing the main characters agree that the honour often comes with much scrutiny, praise and recognition throughout the industry," he continues.

Hayes works at Sanzaru Games and explains that his "main responsibility is providing the in-game character models and textures, as well as high-res renderings of the same characters for promotion and development. As the art team at Sanzaru is small, my time is divided between working with the creative director and concept artists. [Together we] develop the look of characters as well as the actual creation and implementation of in-game assets".

The character artists have a lot on their plate, with modelling being just the beginning. Simantov explains that the

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Props are vital to the design and visualisation of a gaming world, as this assault rifle made by Jamie Martin demonstrates

"actual creation of the character" includes "the sculpting, texturing, materials and technical challenges that apply when building game art. Their next responsibility will be dealing with the game's requirements, technical specifications and potential bugs with regards to placing the character in the actual game. This portion is one of the most critical parts of developing videogames, which you can only master from experience on the job".

While the characters are being brought to life, there's a separate team of environment artists working on a place for them to interact. Bonnie Rosenstein, who works at Electronic Arts, puts it simply: "Environment artists get the approved concept art and begin fleshing out the beginnings of the level while working with the designer to assure sweet gameplay."

Rosenstein explains that her team "primarily models props and levels. We work closely with designers and the art director to create their vision, as well as to give the player a fun and challenging space, without creating a bunch of goofy problems or scenarios that could trip a player up". Looking pretty isn't enough, though, as Rosenstein's team has to "create clean assets, which means we have to be extremely conscious of our poly count, our UV layout and our texture sizes... We have to make a space look amazing with as little as possible, which gets tough because we are always pushing the envelope in every way for bigger, better, prettier and more-amazing results," she explains.

Toni Bratincevic is also an environment artist, specialising in pre-rendered game cinematics. He stresses that interaction with other members of the team is vital: "You always have questions to ask about textures, mesh topology, shader properties and so on. Some days people from other departments meet together to discuss issues, [so] this is where I can ask about problems and get some information I am looking for. I am in constant contact with some teams, like the texturing and matte departments, while other facets of the pipeline are less connected to the environment-modelling team."

Rosenstein agrees, saying she works "mainly with my fellow environment artists" and explaining that "pod structures mean there will be a designer, environment artist, lighter and a producer on one or more levels. This gives everybody a bit of ownership over chapters and levels. Often there are more than one of each discipline in a pod, but usually it's much smaller and more efficient than everybody just tackling the same thing at the same time".

Once the assets have been created, they need to go through the rigging process. Jonathan Avila, a relative newcomer to the industry, explains that he "specialises in animation, but I picked up rigging to help find more work since it's the grunt work nobody wants to do".

Despite this, rigging is utterly vital, as Simantov explains: "Character riggers are responsible for taking the static models that are supplied by the character artists and setting them up for articulation. This involves placing a kinematic skeleton (almost like an armature) within the model and setting up articulation controls that range from simple rotation-based controls to the full facial setup." They also set up the deformation of the model, painting weights and adding extra joints to ensure the character deforms in a believable manner when animated.

RIGGING INSIGHTS

Jonathan Avila explains the day-to-day work of a rigger in videogames

What are your key tasks and responsibilities?
My approach to creating rigs depends entirely on whether I'm creating them for UNITY or UDK. If I'm working in UDK I need to make sure I have the Z-axis up and facing the X+, or to meet a specific joint number or the influence restrictions and not go too far. I also need to ensure I paint the skin weights properly so there is no funky deformation once we start bending and twisting the character.

What are the key challenges when you are rigging characters?
Normally it's the pinching in the elbows, knees and wrist that cause the biggest headache. Since every job I do has different characters, sometimes it's easy, but other times they could be wearing extra elements that make those specific areas very troublesome. Also, depending on the character, the hip and crotch areas can be very problematic.

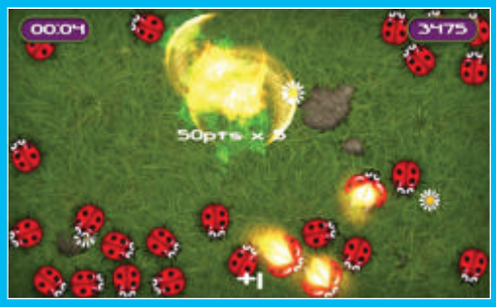
Avila worked as a rigger and animator on *Army Antz*, which will be available on the iPad soon

Get a job in the games industry

ANIMATING VIDEOGAMES

Julian Laing explains how completing animation for videogames is different to films

"Videogame animation requires a great working discipline, though of course this – along with being well-organised – is essential to succeed as an animator in any field. Almost every videogame animation will have to look great from any camera angle, whereas in TV you are often only dealing with one camera... For instance, I've seen walking animations for TV with no leg animation. There was no need since it was a mid-shot camera and you couldn't see the legs. Also, with a TV shot you can often leave the final pose of the character however you like, since the next shot will be a fresh scene... However, videogame animation is much stricter, as quite often a certain animation will have to be a given length, as well as start and end in a specific pose... You may also have to deal with certain hit or contact points that must be easily blendable with another animation or set of animations."



Laing animated crawling bugs and did some VFX for *Bugged*, a game released on Android and iPhone

Riggers have to be technicians as well as artists and it's not just the characters they have to work on

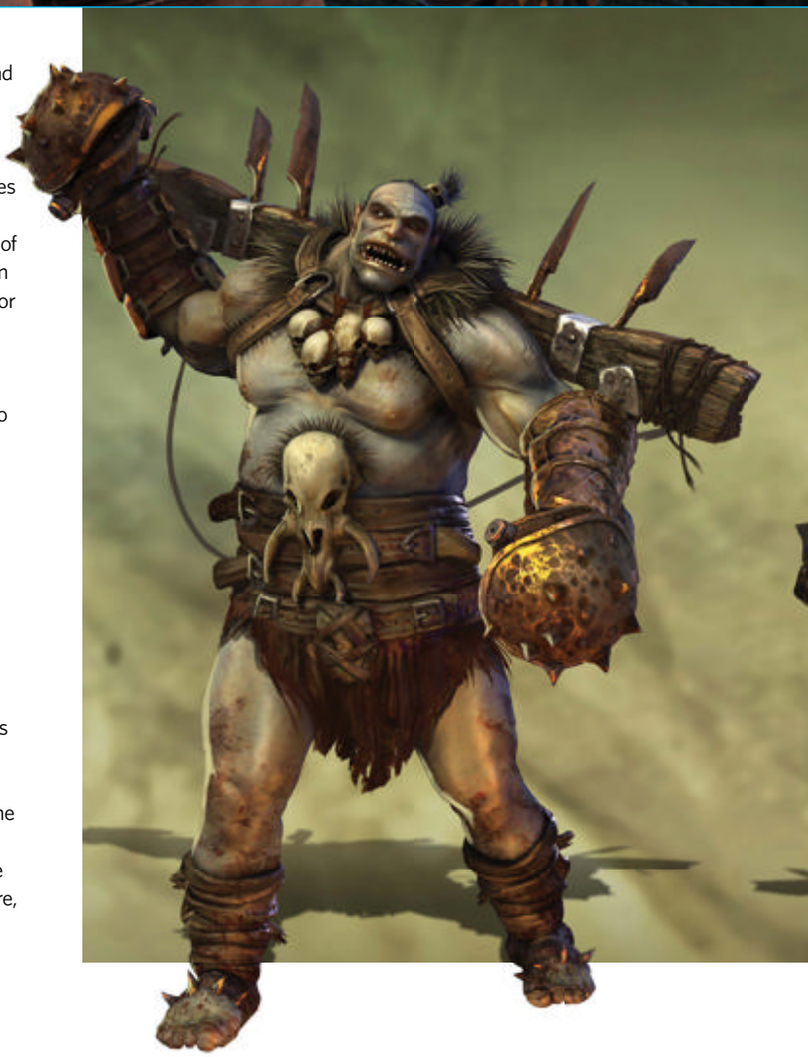
One of the character rigger's biggest challenges is to "make sure that they can get the artistic look they want while still keeping the rig optimised enough for the game engine. Most videogames will display quite a few characters on the screen [then] when more joints are added to a skeleton it increases the animation's processing, memory and so on", Simantov continues to explain. "Riggers are also often required to develop their own set of rigging as well as animation tools to help automate certain aspects of a pipeline, or just to make certain tasks more efficient. These tools are primarily developed in Python, which is quickly becoming the standard scripting language for 3D applications."

In this way riggers have to be technicians as well as artists. But it's not just the characters in games that they have to work on. Rigging is also required for all the props in the game; for instance, Mike Fortais specialises in rigging and real-time engine integration, and he explains that "the hardest part about any real-time rigging is creating an intuitive and easy-to-use system that's powerful enough for current-generation visuals. All the while you have to ensure that the work will properly carry over to the game engine. Sometimes props such as a gun may seem simple at first, but when your art director wants to see fancier effects like flailing bits of rope or a really complex reload sequence, things can become complicated very quickly."

Because of this, Fortais says his key responsibility is to "determine which features are required for the project at hand, then to develop a pipeline that will meet the needs of each department I'm working with. This can be an easy-to-use rig for a single animator, or a full-content pipeline that spans across multiple artists and programmers alike. To sum it up, I'm brought in to bridge the gap between the art and programming teams to help deliver a great final product".

Once the rigs are in place, the animation can begin. This part of the process could at first seem far less complex than those proceeding it. However, a great understanding of psychology, drama and human anatomy is required, along with the technical capabilities.

Animator Julian Laing worked on *L.A. Noire*, where he dealt with full-body motion-capture for the interview sequences between Phelps and various witnesses. "I had to select, blend and match up the mocap footage to the audio dialogue and the facial animation, which was captured separately and mapped onto the faces. The facial animation and audio was already there, but I had to complement the actors' performances by producing plausible and



Isaac Clarke and merciless soldier John Carver needed some amazing spaces to fight in Electronic Arts' *Dead Space 3* and Bonnie Rosenstein was happy to help

Working with the extra elements attached to characters – such as armour and accessories – can seriously protract the rigging process

Rigging might be the "grunt work", as Jonathan Avila puts it, but it's vital for making animation believable and gameplay smooth

well-acted body animation from the available mocap footage," he explains. Each detail and decision also comes under close scrutiny. Laing continues: "Normally as an animator you would answer to your lead animator who would in turn answer directly to the producer and director."

Simantov puts this in another light: "Animators are the people who essentially breathe life into the characters. Once the rigger has passed the work to the animator, it's their job to move the rig controls over time, then essentially add movement and purpose to the characters." Working with videogame animation can be far more technical than film or TV animation, Simantov argues, because the artists "are required to plug their animation into complex state trees. [These] either make the character playable or give them some level of artificial intelligence. This means a run animation needs to be loopable and transitions from idles to walks, to runs, to stands, to jumps [are all required]".

Laing points out that workflows differ substantially between the videogame and TV worlds: "The schedules for producing TV shows tend to be steadier... Quite often you can be on a schedule of an episode a week, which can be a heavy workload, but it has been fairly consistent in my experience. You tend to put in extra hours from time to time, but with TV there's only one crunch period right at the end of production. [This is] to make sure every last episode is rendered and out of the door [on time]. In a videogames company there can be several intense crunch periods over the lifespan of one project, with various milestones and deadlines having to be met."

From Rosenstein's perspective, the difference between videogames and films is lessening as technology improves, but "there are still key differences between the two. In film, frames have to be rendered out and can take hours. With a videogame you must create your work to look almost film quality but it has to render at 30-60 frames per second. You have to be mindful of texture size as well. Only in rare instances can you use textures of 1,000 pixels and up, whereas textures for a film can be as large as 4,000-8,000".

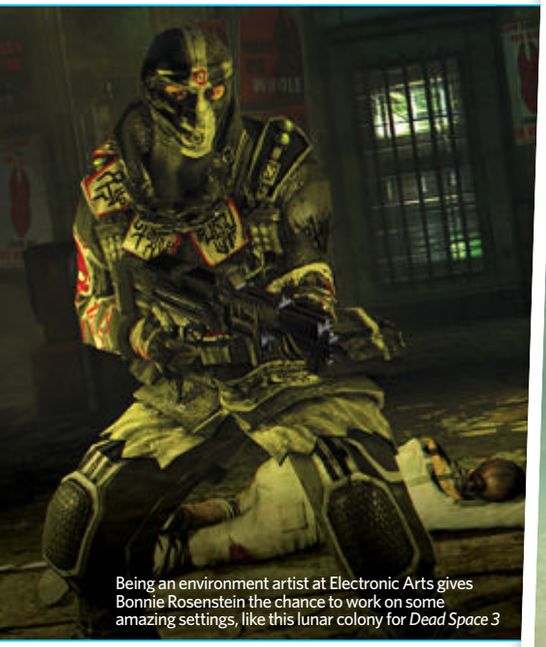
After the animation is complete, any VFX work required can be completed. Bringing everything together is the job of the lighting artist. Simantov explains that this is "a fairly new position in videogames, but it has been around for a while in film and, with today's more complicated titles, has moved to become a staple with all next-generation products. The lighter is responsible for creating all the lighting in the environments. This is a huge responsibility in that they are the ones creating the mood and tone for each particular area. Lighting is one of those areas of art that can make or break the look of your game".

No matter how strong the development process, things will inevitably change. These changes could occur at all stages and involve all the artists. Coming at the end of the workflow, this can be particularly hard on lighting artists: "It often means that the environment will change when the gameplay requires it. These changes indicate that the artist will have to keep fixing the lighting that is broken when the environment alters around it. They are the last in the process and often have to rework or tweak areas until the very last moment in the project," says Simantov.

> Animators are the people who essentially breathe life into the characters. Once the rigger has passed the work to the animator, it's their job to move the rig controls over time and essentially add movement
>
> **Judd Simantov**

Get a job in the games industry

> Your studies don't finish when you graduate – in fact, I don't think they ever finish!
>
> **Julian Laing**

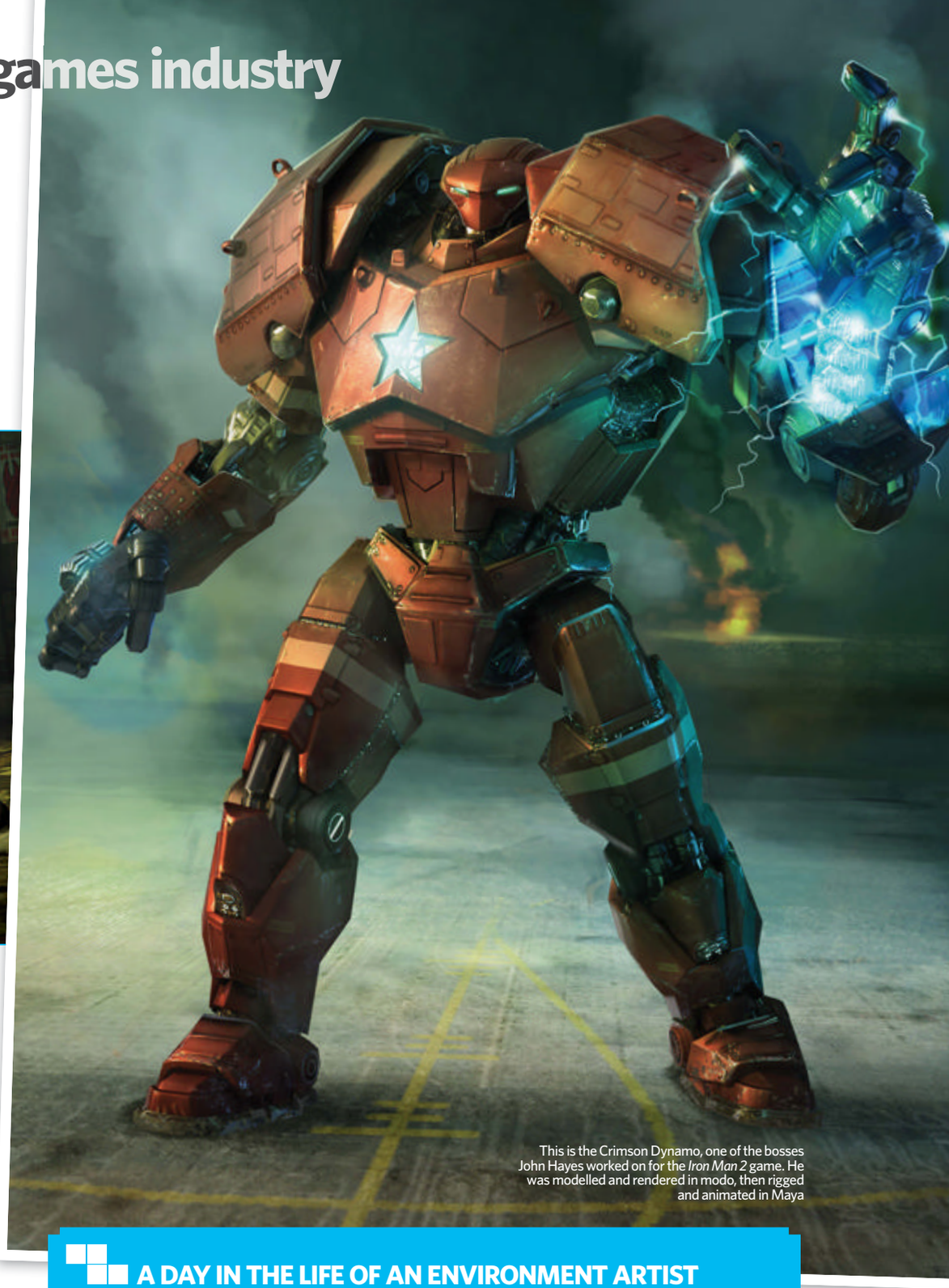


Being an environment artist at Electronic Arts gives Bonnie Rosenstein the chance to work on some amazing settings, like this lunar colony for *Dead Space 3*

If you want to work in videogames, it's a good idea to consider how the industry's pipeline works and where you could fit in. However, be prepared to go with the flow too: "The industry is not standardised in the same way conventional professions are," Simantov points out. "So much of it is about your portfolio and how good your work is. This means you can work on your stuff at home or in your spare time and really elevate your chances of getting a job."

Laing advises that "your studies don't finish when you graduate – in fact, I don't think they ever finish! I've had to learn an awful lot on the job and I still study and research various aspects of my craft; for example, building new character rigs, planning out certain animations or learning new software".

The world of videogames has a lot going for it, but unlike in other areas of 3D, women are still drastically under-represented. "Both of the times I've worked in TV, the gender split has been close to [an equal split], perhaps only a few more guys," says Laing. "But I've never worked in, or even heard of, a videogames studio that even comes close to parity." The industry is a great place to work, so, especially if you're female 3D artist, it's time to roll your sleeves up and get that job.



This is the Crimson Dynamo, one of the bosses John Hayes worked on for the *Iron Man 2* game. He was modelled and rendered in modo, then rigged and animated in Maya

A DAY IN THE LIFE OF AN ENVIRONMENT ARTIST

Electronic Arts environment artist Bonnie Rosenstein explains her working routine

"Once the coffee kicks in, I sync to all the latest work everybody has checked in the previous night and get the latest build. We have task-management software that keeps track of our jobs [and ranks them in order of importance], so we obviously tackle the high-priority stuff first... We often work from concept art, which is great as we have such amazing concept artists that build their work in 3D... However, sometimes there is no concept art and we just have to create something on the fly, and then the art director approves whatever we come up with... Once the work is approved we have to double-check it to make sure that the asset is clean. If we check in a dirty asset and break the build or the gameplay, very unhappy people will call down the thunder upon you."

Being at a big company like Electronic Arts provides Rosenstein with a great creative environment to work in

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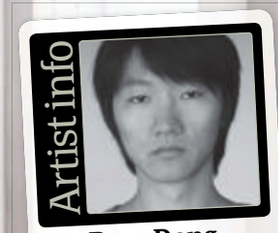


Artist info

RenPeng Dong

Personal portfolio site
www.oldrhyme.cgsociety.org

Country China

Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

Non-US readers turn to page 80

Crowdfunding The Golem

Moonbot Studios looks to the Kickstarter community to help fund *The Golem*, a videogame based on a Jewish folktale

All images © Moonbot Studios

CROWDFUNDING THE GOLEM

The award-winning studio behind 'The Fantastic Flying Books of Mr. Morris Lessmore' kickstarts an exciting, new project

Developing videogames is often a risky business, but even more so when you're venturing into the industry as an independent studio. How do you fund the research, coding, artwork, marketing and distribution, yet still keep the bills paid while you're doing it?

One route is to use the crowdfunding model championed by online platforms such as Kickstarter. So far over $96 million US has been pledged across more than 4,300 game-related projects on this platform alone. However, it's not as simple as just setting out your stall and waiting for the cash to roll in. According to Kickstarter's figures only 1,369 of videogame projects successfully reached their funding goals.

Such figures haven't stopped one group of creatives from Louisiana from entering the arena, however. Moonbot Studios (**http://moonbotstudios.com**) is seeking to use the Kickstarter community to help fund its videogame, *The Golem*, which is based on a Jewish folktale that has already inspired pop-culture phenomena such as *Frankenstein* and *The Terminator*. Founded by William Joyce, Brandon Oldenburg and Lampton Enochs in 2009, Moonbot Studios is seeking $750,000 US to begin development on a PC version of the game.

Through Kickstarter, backers can pledge as little as $15 US to receive a copy of the game or higher amounts for rewards. These include Moonbot Studios T-shirts, original art and even an appearance in the game. Every backer receives access to Moonbot Studios' private production blog to track the development process. If additional funds are raised, they will be put towards bringing the game out as a console version.

Read about *The Golem* on Kickstarter*: **http://kck.st/11IvNU8**

FROM ANIMATION TO INDIE GAMES

Moonbot Studios, the multi-platform storytelling company, embarks on its first independent game...

Studio name Moonbot Studios
Location Shreveport, Louisiana, USA
Expertise Animation, publishing and developing mobile apps
Key clients Sony PlayStation's Wonderbook, Ford Motor Company, National Wildlife Federation, Roald Dahl estate, Nestlé, The Polyphonic Spree
Company history In August 2009 William Joyce and Brandon Oldenburg founded Moonbot Studios with producer/production manager Lampton Enochs. Its first animated short was the Oscar-winning 'The Fantastic Flying Books of Mr. Morris Lessmore' in 2011. More inventive iPad storytelling apps followed.

Bohdon Sayre
Role: *The Golem* project technical lead
Expertise: Technical direction, videogame design
Software/tools: Maya, Unity, Adobe Creative Suite

Adam Volker
Role: *The Golem* project creative lead
Expertise: Art direction, game design
Software/tools: Pencil and paper, Adobe Creative Suite

Brandon Oldenburg
Role: Creative partner
Expertise: Interactive design
Software/tools: Pencil and paper, Adobe Creative Suite

Lampton Enochs
Role: Managing partner
Expertise: Film production

TIMELINE

2009 Moonbot Studios is founded in Shreveport, Louisiana , USA

2011 The team releases the 15-minute animated film, 'The Fantastic Flying Books of Mr. Morris Lessmore'

2011 (May) The studio releases an eBook app of 'The Fantastic Flying Books of Mr. Morris Lessmore' on the Apple App Store

2011 (Jul) Moonbot Studios and The Polyphonic Spree collaborate on an interactive, character-based, narrative music video released as an iOS app, Bullseye

2012 (Jan) Numberlys, a storytelling app based around the origins of the alphabet, is released for iPad, iPod and iPhone

2012 (Feb) Moonbot Studios' 'The Fantastic Flying Books of Mr. Morris Lessmore' is awarded Best Animated Short Film at the 84th Academy Awards

2012 (Jun) IMAG-N-O-TRON: The Fantastic Flying Books of Mr. Morris Lessmore Edition, a new storybook app experience, is released as an iPad app

2012 (Aug) *Diggs Nightcrawler*, an augmented-reality story in development for Sony PlayStation's Wonderbook, is trailed at gamescom 2012 with a 1.23 short

2012 (Nov) Moonbot Studios is tasked by the Roald Dahl estate and Nestlé with reinterpreting key elements from *Charlie and the Chocolate Factory* and the Willy Wonka mythology. The elements were for Los Angeles store, Sweet! Hollywood

2013 Moonbot Studios begins a 50-day Kickstarter campaign to fund its next project, *The Golem*...

*At the time of going to print *The Golem* is not yet funded. Visit **http://kck.st/11IvNU8** to see if it met its target

Crowdfunding The Golem

> “Whether you are making videogames or movies, some things never change and quality wins the day”
> **Brandon Oldenburg**

Moonbot's game will bend historical reality and folk tales to take the player along an emotional journey through the Golem's development

These clay-sculpted models of the Golem were created by technical directors Dylan VanWormer, Logan Scelina and Gordon Pinkerton

TIPS FOR KICKSTARTER

Moonbot Studios' managing director Lampton Enochs reveals how to best approach a Kickstarter campaign for a videogame:

- Kickstarter is a full-time job. You can't just launch your project and wait for the money to roll in. We've been working constantly on updates and creating documentation about our game since launching. Hitting the Launch button meant moving full force into the project.
- Be respectful of all the feedback you get from backers and people considering backing your project.
- Don't underestimate the cost of producing backer items, shipping and what Kickstarter and Amazon take out of your budget. You need to actually have money left over to fully fund your project.
- Believe fiercely in your project and be committed to it no matter what. Hopefully, that desire and belief will make its way into the atmosphere and attract like-minded folk who come to share your goal of introducing this experience to the world.
- Give very careful consideration to the implications of a successful campaign. Right after everyone high-fives their success, they need to be hard at work making sure they deliver on their promise.

Other funding platforms are available, including Sponsume (**www.sponsume.com**) and Wefund (**http://wefund.com**) in the UK.

Moonbot waited for the right moment to launch on Kickstarter. "We planned a campaign for months," says Lampton Enochs

Paying your dues

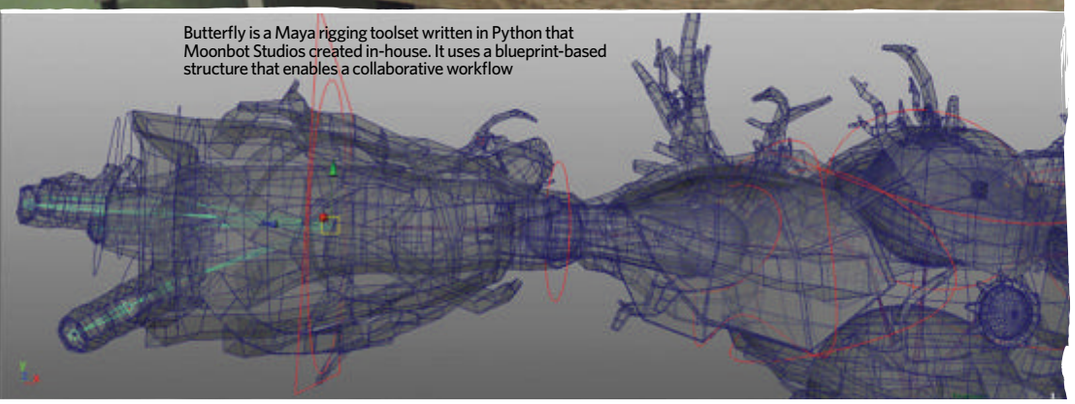
When raising capital for your project, it always helps if you are a known quantity. Luckily, Moonbot Studios is certainly that. For one thing it has children's book illustrator/author and animation legend William Joyce as a founding father, as well as a wealth of talent from animation, VFX and videogame companies. The most recent ventures from Moonbot Studios include Oscar-winning animated short 'The Fantastic Flying Books of Mr. Morris Lessmore', iOS story app Numberlys and the forthcoming *Diggs Nightcrawler* for Wonderbook on PS3.

The Golem is another work of rich imagination set in an alternate version of early 16th-Century Europe, where Prague is threatened by an evil army led by Cesare Borgia. Rabbi Loew, the greatest scientist and religious leader in the city, has a vision of a giant man made of clay, wood, metal and stone — a Golem. The idea is for players to develop skills and wield the Golem against Borgia's evil forces.

However, it's one thing to be known for interactive storytelling and quite another to head into videogame territory. Creative lead Adam Volker explains the thinking behind this decision: "The Golem and the player can have the same journey, each learning something new as they progress through the game. Mastering control of the Golem will be about mastering control of yourself, so that you can protect Prague. Interaction and gameplay bring something totally special to this narrative that we couldn't get out of a passive experience. We want players to experience a wide range of emotions in the game."

"We approach games like theatre directors and amusement park architects," adds Creative Partner, Brandon Oldenburg. "In the realm of cinema, the window is controlled by the director. In a videogame the window is controlled by the actors and/or park-goers. Actors are built and designed for their roles, not for specific scenes. Worlds are built more like theme parks versus set façades. However, setting the stage for a desired outcome is only half of it. Probably the biggest difference we deal with is the other half, making the game fun and challenging to play... Whether you are making videogames or movies, some things never change and quality wins the day. We get there through the discipline of refinement with several fast iterations."

Volker explains that Moonbot Studios is building the core of *The Golem*'s team, establishing production milestones as well as clarifying plot, gameplay and design goals. "The next step is to start producing the game if we are funded through Kickstarter," he adds. "That's a major component of what we're working on...."



Butterfly is a Maya rigging toolset written in Python that Moonbot Studios created in-house. It uses a blueprint-based structure that enables a collaborative workflow

Funding: pick a number

Managing director Lampton Enochs reveals that Moonbot Studios had been considering a Kickstarter campaign for some time. "We have always liked the idea of fan-funding – the chance to involve and create a fan base as we lift a new project," he explains. "Kickstarter made the most sense because it has a very active community that seems to back the kinds of projects we create. We knew that we would be entering the fray with certain challenges: we're a young studio and we're relative newcomers to the videogame space. What's already gratifying is the level of interest and fan exchanges the campaign has generated. We've been asked a ton of interesting and thought-provoking questions and we feel like we've attracted some new fans to the studio..."

"It's not easy to pick a number," says Enochs when asked about the target of $750,000 US. "Building a videogame of the quality we want to deliver is [expensive]," he explains. "You can pick a low number with a higher chance of funding, but you're handicapping yourself right out of the gate. Go too high and your chances of funding are lower. We picked a number to [assure us] that we could deliver the best-possible videogame to the world. Will it be every penny spent to create this game? The answer to that is no."

If more is pledged, the game can launch on more platforms. "Of course, more funds equals more animation, more environments, more gameplay," Enochs explains. "We love the story of the Golem and the world he inhabits. We'll be happy to play in that sandbox as much as we can." The team are also keen to remain independent of larger studios. "Creative freedom is like the golden chalice for any studio," says Oldenburg. "Maintaining independence is a constant battle. It's liberating and thrilling for a studio to be the master of its own universe but it's also way more dangerous. You don't have infinite lives to get things right. One wrong move and you're frantically scrounging around in your pockets to find more quarters before the clock runs out."

> "One wrong move and you're frantically scrounging around in your pockets to find more quarters before the clock runs out"
>
> **Brandon Oldenburg**

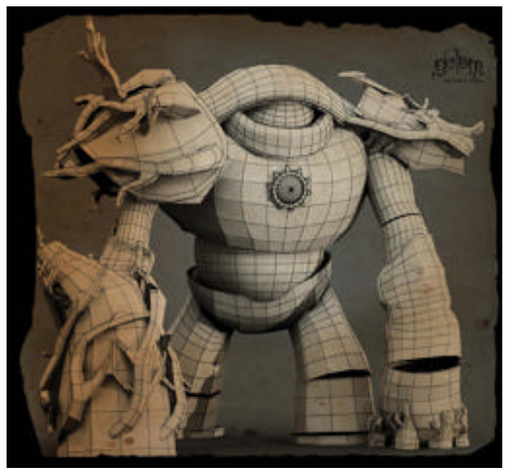
A WORK IN PROGRESS

Creating the Golem itself is as much a magical and involved process as Rabbi Loew's conjuring

The art team begins by sketching out character designs, usually with paper and pencil, before moving to a Cintiq/Photoshop setup to finalise designs. This sketch is by Brandon Oldenburg.

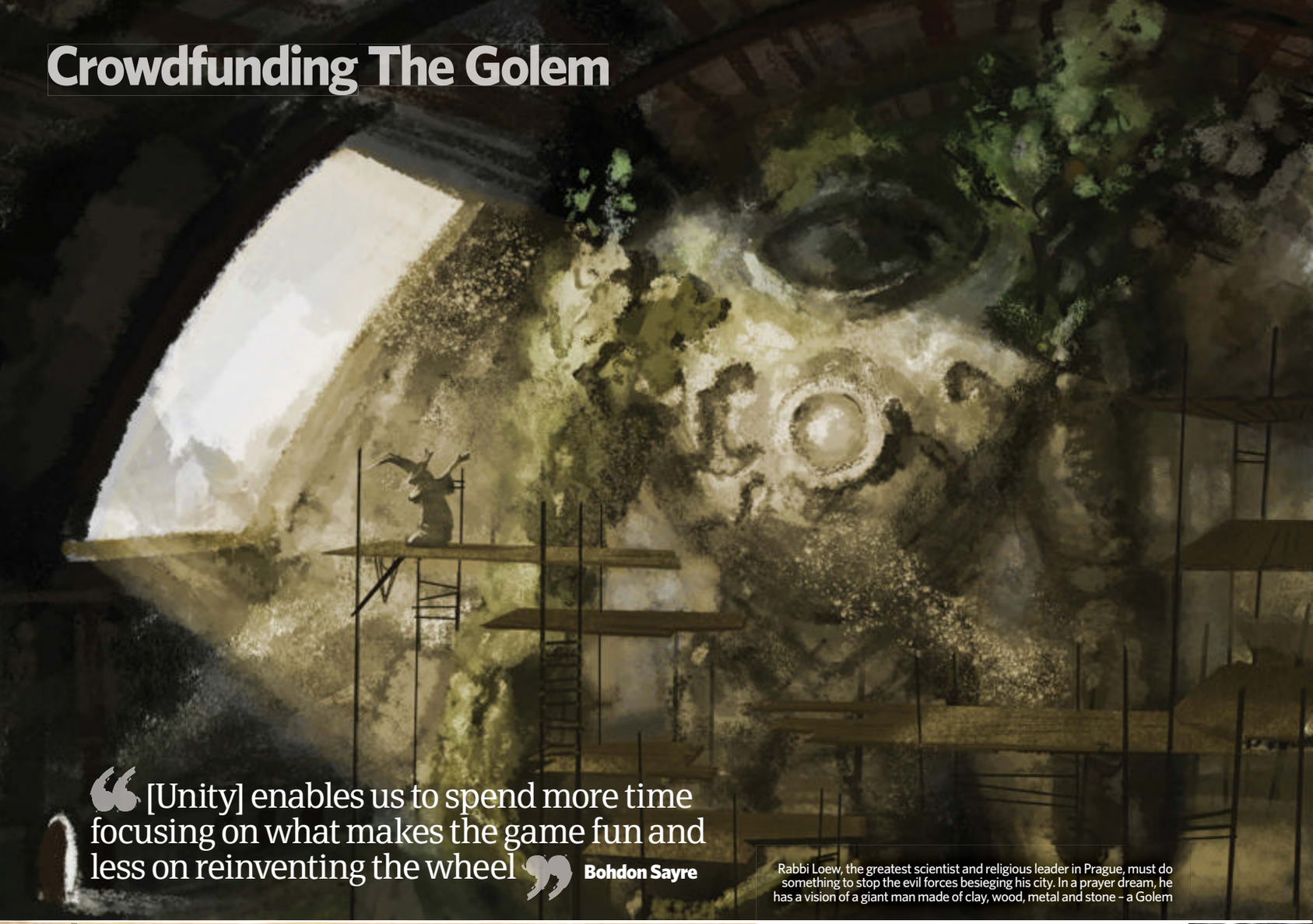
For the title character, three of Moonbot Studios' technical directors, Gordon Pinkerton, Dylan VanWormer and Logan Scelina, create a sculpture out of clay. This helps them understand the Golem's form and organic feel.

"[Working in clay] really makes you think about the forms a lot more..." says Logan Scelina. "In the computer you can easily move around anything you want quickly. However, when dealing with clay, if you have to move the arm it means several hours of work instead of several minutes."



The Golem itself is then modelled in ZBrush by Logan Scelina for preliminary animation tests

Crowdfunding The Golem



> [Unity] enables us to spend more time focusing on what makes the game fun and less on reinventing the wheel
>
> **Bohdon Sayre**

Rabbi Loew, the greatest scientist and religious leader in Prague, must do something to stop the evil forces besieging his city. In a prayer dream, he has a vision of a giant man made of clay, wood, metal and stone – a Golem

Developing, experimenting & adapting

"Most of the projects we've done so far have been developed in varying ways, which is both a blessing and a curse sometimes," says Bohdon Sayre, Moonbot's lead TD. "We focus heavily on story at the beginning of any project, as it enables us to make meaningful decisions about any other aspect that contributes to the final experience. We're always trying to improve certain aspects of our process, such as early prototyping, as I'm sure any company does."

Sayre suggests that one of the better aspects of varying projects in this way is the freedom to experiment. "When to rough-in the game, create a vertical slice or make a subset of both are all things that we debate project to project," he says. "I believe it helps us develop towards a more efficient workflow. To us, it's really about making sure we pay attention to what we liked and didn't like about each project, then learn as best as we can moving forward.

"One thing we're very adamant about is that our mechanics and story design influence each other as much as possible," Sayre continues. "We believe that even if the mechanic or story started individually, [each of these aspects] should lend meaning to the other in important ways. The order of our process has varied on each project, but what's important to us has remained the same: a meaningful story and experience that fully takes advantage of the medium in which it's presented."

Moonbot Studios has turned to Unity on several of its past projects and *The Golem* will also make use of this engine. "It enables us to spend more time focusing on what makes the game fun and less on reinventing the wheel," explains Sayre. "Unity has been extremely easy for the team to pick up. We've found that the workflow benefits like Editor scripting and other tools have been invaluable for a lot of our projects so far. In an extremely small amount of time we can represent any custom objects or data in editable and visual ways..."

Some of the tools Moonbot Studios has created include a node-based, non-linear, interactive animatic that the team calls 'Game Sketch'. "It's written entirely with Unity's Editor tools and enables us to sketch in the framework of an entire game with storyboard sequences," says Sayre. "We'll replace the sequences with prototypes and eventually the final game. [This] enables us to start with a rough version of the entire game and refine it incrementally."

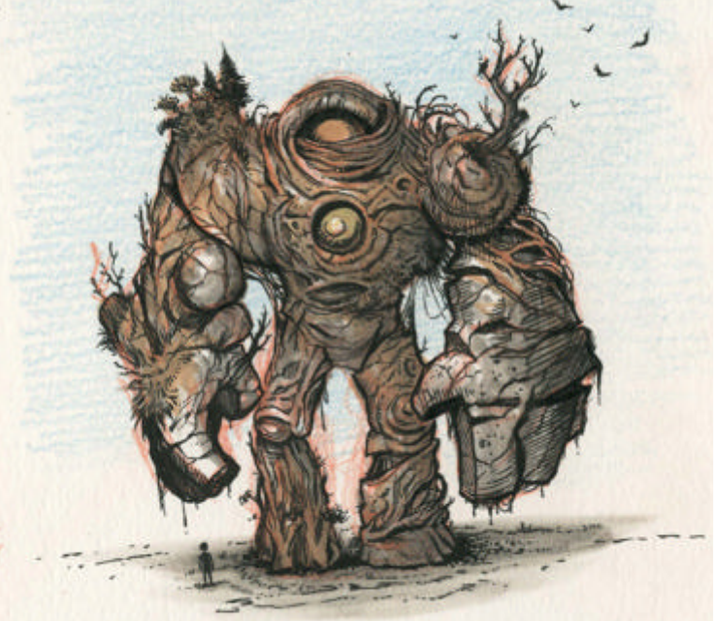
Moonbot Studios created Game Sketch in-house to help plan its games. "It's like an interactive animatic that enables us to drop in storyboard sequences, images and Unity scenes so we can see how the user will move through the game," says lead TD Bohdon Sayre

THE PROS & CONS OF UNITY

One of Unity's strongest points is how quick and easy it is to prototype, which will be a huge asset to Moonbot Studios as they continue to develop The Golem. "The biggest challenge we will have to face is making sure we can hit the visual style we want," reveals lead TD Bohdon Sayre. "*The Golem* is not designed to be hyper-real, but rather more stylised in ways that respect the visual priority that we feel videogames lack. We're excited to bring this game to fruition using Unity as our engine."

However, there are cons to Unity as well. Sayre explains: "We've hit long asset-import times with iOS projects, as other Unity users may be familiar with. We haven't gone so far as trying the Asset Server that Unity provides. Overall, most of the issues we've run into have been solved by improving our own workflows, not by working around the problems. In short, the amount of efficiency we gain from Unity far outweighs the occasional hitch along the way."

Crowdfunding The Golem



Early models of the Golem were based on this sketch by Joe Bluhm

Moonbot Studios will use Maya and ZBrush for the 3D work. This is an early model of the Golem based on Joe Bluhm's drawings

These stills are from animation tests that Moonbot Studios is working on. These help build an understanding of how the in-game camera should work and how the Golem should move

> "Our artists and modellers/lighters work hand-in-hand to get the game to look exactly how we want it"
>
> **Adam Volker**

These concept drawings created by artist Kenny Callicutt, show the Golem in action

Bringing the game to life

The art for *The Golem* will have a strong sense of fantasy and whimsy. "We want something textural and simple, something that has a lot of depth and atmosphere: a heavily-stylised yet real space, explains Adam Volker. "Our artists and modellers/lighters work hand-in-hand to get the game to look exactly how we want it."

Moonbot Studios will be using Maya and ZBrush for the 3D content, plus a proprietary rigging toolset for the character rigs. "We'll use Adobe Creative Suite software, as well as a few other utilities such as xNormal and nDo2 for texturing and other necessary assets," adds Sayre.

Sayre reveals that there will be more than one set of rules in the game. "We want the mechanics to be suited to what you must accomplish at any point in the story," he explains. "These could vary from simple things like carrying building materials, to difficult ones like capturing enemy spies. The player will learn to control the entirety of the Golem incrementally, starting with basics like how to run smoothly. What we want to do is teach the player various skills that they can master in simple ways, then [ask] them to use these skills when more is at stake. There's a ton of experimenting we'll be doing with the controls and mechanics and how they can be used to evoke the emotions of the Golem in the player."

"I think the Golem's asymmetry is [a real] nugget of uniqueness in this game," adds Volker. "[He's a] brute who does more than smash. [He goes on] a strong internal journey [that brings] meaning to everything the player does."

At the time of writing the $750,000 US target has to be hit before the team can really breathe life into *The Golem*. "Kickstarter makes it clear that funding through this method is a risk," says Enochs. "Should Kickstarter not be successful, we'll likely return to traditional means of funding, [with] the implication being that the process could be extended... We are dedicated to telling this story and Kickstarter is the ideal means to that end, but certainly not the only one. We will be delivering a really cool game no matter what."

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Muhammad Taher

3DArtistonline

Username: mtaher

Website www.mtaher.net

Country Egypt

Software used 3ds Max, V-Ray, Photoshop, Lightroom

Luxury Villa in Qatar

This luxury villa is one of my latest works, located in Doha, Qatar. The main target when I started working on the 3D visuals for this project was to focus on the strongest elements and the general beauty of the design. The lighting and camera angles are very important to me as they make the image truly interesting.

> For the left wall panels and the stair railings I used RailClone from iToo Software. I created a spline, attached the geometry to get the procedural mesh

Software used in this piece

3ds Max | V-Ray | Photoshop | Lightroom

"I used a V-Ray Dome light loaded with Peter Guthrie's HDRI – 1828 Dusk Sun to light the scene. V-Ray Lights act as Skylight Portals to help with the light spread"

"Marble texturing techniques were created by drawing shapes in Photoshop and dividing them into layers. I used these as masks for blending several marble materials"

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Jorge Lacera

Personal portfolio site http://lacera.blogspot.com

Country USA

Software used Photoshop CS6

Expertise Creating in-game 2D assets and supporting marketing materials

Concept a game character

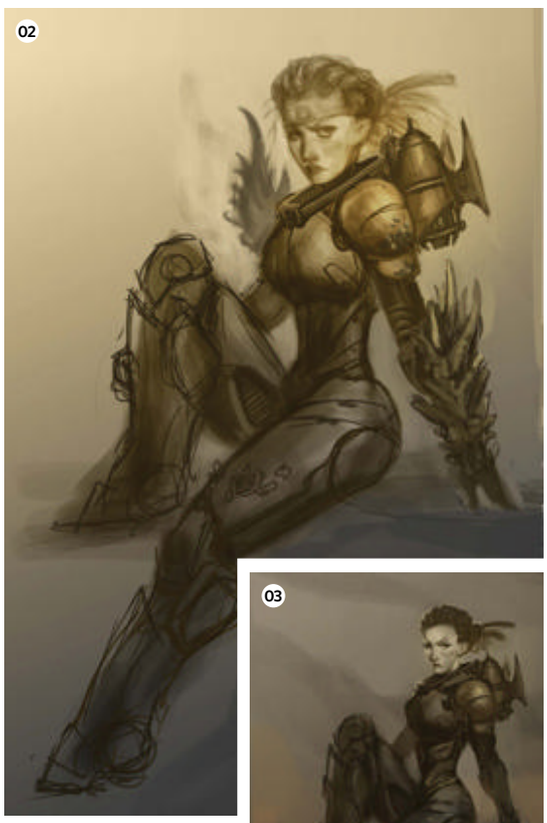
Spacegirl 2013

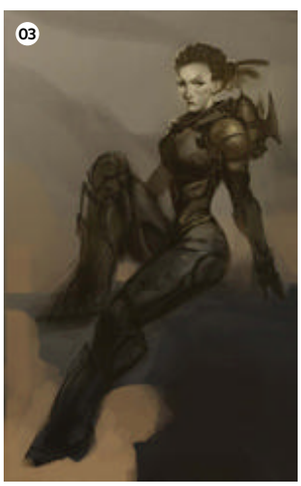
"This character design is intended to give a 3D artist enough information to generate an in-game 3D model from"

Jorge Lacera is the lead concept artist at Irrational Games. He recently worked on *BioShock Infinite*.

For the purposes of this tutorial I was interested in creating a striking videogame heroine to pay homage to my love of B-movies and 1950s pinup art. To highlight these aspects I'm choosing to avoid the standard T-pose, front/side and three-quarter view presentations, as I feel an alternative pose can broaden a concept's usability. Pinup layouts lend to marketing while giving all the information a modeller needs to create killer assets.

I focus quite a bit of time exploring the design on paper first, which enables me to make quick iterations and brainstorm the overall design within a low-impact setting. The final touches include emphasising the mood and tone of the piece through colour, texture variation and lighting. All of these elements will help to tell the story of this heroine.





01 A Moleskine book and black gel pen are great for brainstorming on the go

02 Try to keep a macro view of your work before deciding on fine details

03 Don't be afraid to make big changes if you're unhappy with the direction

01 Begin the sketching phase

The goal of this phase is to try out as many design ideas as possible in a short period of time. By using limited tools – in my case a standard Moleskine sketchbook, black gel pen and a brush pen – I try to avoid getting caught up in small details that don't add a lot of character or address specific design requirements. At this early stage there's the possibility of including a helmet, which I'll revisit later.

02 Move to the layout stage

In Photoshop, it's important to keep a broad view of the design. By bouncing around the image I'm able to hit all the vital areas of information that help portray the character. Eventually I'll begin to hone in on the face, which will go a long way to selling the character's attitude. I use a soft brush for as long as I can, then when the composition is working I can zero in on details with a harder-edged brush.

03 Render the final concept art

Before getting to this stage I realised my character's pose wasn't as dynamic as I'd like, so I make some broad adjustments to the torso, head and chest. This gives the character far more presence, or aura. I also start laying in my tones and values in monochrome, which enables a clear view of the volume and shape of the character without being distracted by colour.

It's important to focus a lot of detail on her face and hair. I find it easier to complete a piece once I have these details down.

The three-quarter view gives enough information to fully render the character in 3D. This also provides the modeller room to improvise.

Secondary light sources and rim lighting can help define the form and offer hints at the texture. This provides more detail for the modeller to work with.

I've add the shoulder decal to give her a sense of place and history. Where did she get it? Is this even her armour?

Time spent developing the concept art: 30 hours

Overall texture and tonal blocking is crucial for the character to read well in 3D. Big, bold statements are best.

Always keep the purpose of the concept in mind. It must serve the needs outlined in the brief. Anything more is wasted time.

CREATE THE COVER IMAGE

From concept to final render with *BioShock Infinite* talents, Jorge Lacera & Gavin Goulden

Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Gavin Goulden

Personal portfolio site http://gavimage.com
Country USA
Software used ZBrush, 3ds Max
Expertise Character art, modelling, texturing, rigging and sculpting videogame assets

Master ZBrush: model for games

Spacegirl 2013

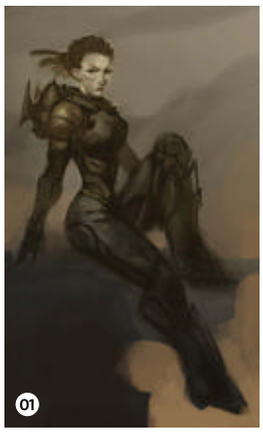
"This is a high-poly model specifically created as a target for videogame-quality assets. The goal is to create a character that can fit in mainstream media, but with a retro feel thrown in for style"

Gavin Goulden is a character artist at Irrational Games. He has worked on titles such as *BioShock Infinite*, *Dead Rising 2*, *The Bigs 2*, *F.E.A.R. 2: Project Origin* and *Damnation.*

Working from Jorge Lacera's concept here, the goal is to create a science-fiction heroine that's relevant to the current market, but has a retro feel we can associate with our youths.

When working from a concept I prefer to keep the process organic and flexible. I rarely work from a formal model sheet as, usually, the proportions are already locked down in a big project, since you have to share skeletons. Instead, I prefer to grab a snapshot of the character that best conveys what and who it is. Not every detail needs to be figured out, as usually this is something that the character artist can handle alone. A few extra bolts and panels won't destroy the overall concept of the subject and I think time is better spent discovering the character's overall mood.

Here we'll be using ZBrush with some hard-surface modelling in 3ds Max; however, the following methods can be applied to any 3D program. I will be focusing on high-res modelling using techniques geared towards baking down Normal maps for videogame assets.


01

01 Plan your workflow

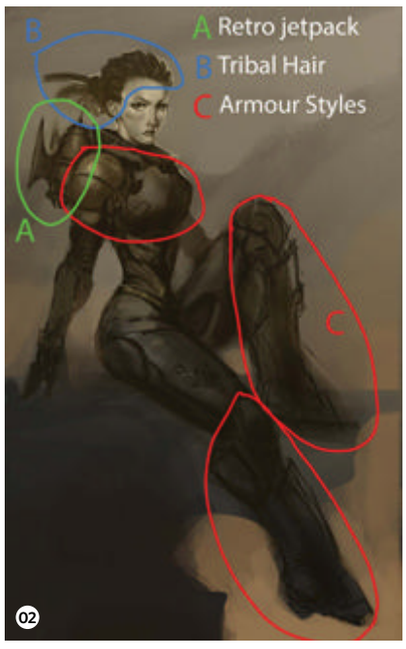
When I receive a character concept I take a moment to analyse how exactly I'm going to tackle the project on a technical level. Generally my workflow stays the same from project to project. I take simple steps like finding symmetrical details that can be copied, aspects that may be exaggerated and anything that can be a problem during production. Too many fine details won't translate well in a game, but luckily this concept is simple and, other than translating the model into a relaxed bind pose, I don't foresee any major issues.

Troubleshooting

Highlight any areas that will require special attention

02 Identify key points

There are defining aspects within a concept that help sell the mood and underlying idea of a character. In this case the mismatched armour pieces (especially contrasted against the streamlined body armour), the tribal hairstyle and evidence of battle damage are all pieces of the character. I absolutely need to nail – and almost emphasise – these parts to help translate the concept into a 3D model.



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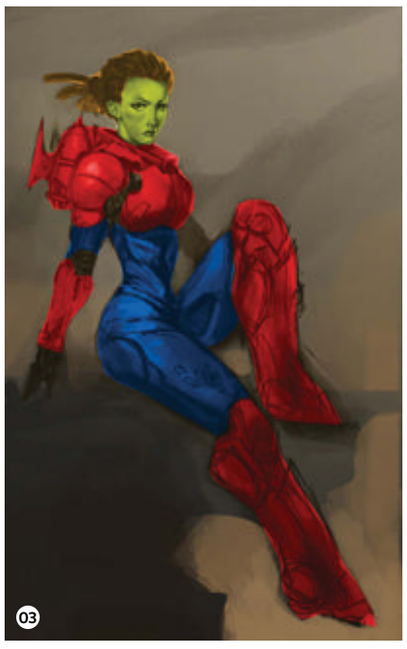

03

03 Define the materials

It's very important to separate the different material types within the character. At a glance, the subject may appear to be made of more or less the same material, but on closer inspection you'll see there are several different layers. The character is wearing a spacesuit that has flexible armour attached to it, with even heavier armour over the top of that in select areas. Defining these elements will help influence how the character develops. The suit and flexible armour can be handled in ZBrush, but the heavier armour pieces will likely need extra work in 3ds Max.

01 Check the concept and spot any trouble areas, specifically details that may not play well with modern game engines

02 Pick out key elements of the character concept to help translate it into 3D

03 Break down your concept to help define your workflow

Concept

The concept from Jorge Lacera is exactly what I need to get started. It has enough detail to capture the personality within the character and allows room to play with details as I start modelling.

With the Disc

Tutorial files:

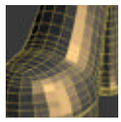
- 3dartist_GavinGoulden_spacegirl.ZTL file
- Custom Alphas
- Tutorial screenshots

Learn how to

- ☑ Sculpt characters to be used as videogame assets
- ☑ Build a base mesh
- ☑ Model hard surfaces to be applied to models
- ☑ Use masks for detailing
- ☑ Prototype with ZBrush's ShadowBox feature
- ☑ Manage your different layers within SubTools
- ☑ Use NoiseMaker to generate surface detail

Problems & solutions

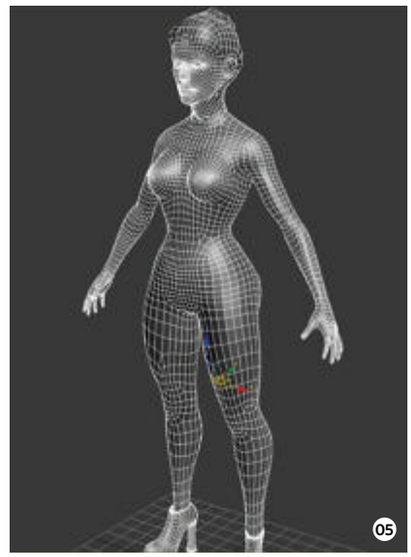
When the concept was being defined for this tutorial, I worked alongside Jorge Lacera to squash any issues that could possibly come up during production. The hairstyle, in particular, was chosen to avoid sorting issues, while the suit design was kept mostly symmetrical to enable a quicker sculpt. With the addition of asymmetrical armour pieces the suit is a much bolder statement. Since it follows the proportions of a female human figure it's easier to work with and removes some of the guesswork. The main issue with the workflow is translating the model into a bind pose (a T-pose at 45 degrees, upright but slightly relaxed), which is more common and easiest to work with. This process requires a good working knowledge of human anatomy. By creating a roughed-in female base mesh (which can be the base mesh from another project) I can begin to tweak the details to the model.



Model the base mesh

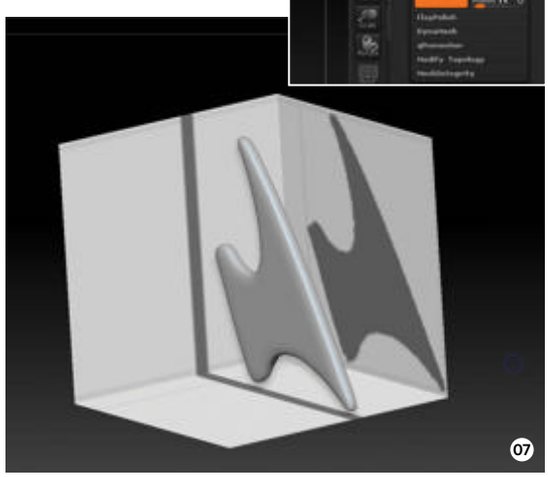
Create a low-detailed model ready for sculpting

04 Block in proportions The first step is to block in the major proportions of your character, while not worrying too much about details and focusing on just getting the forms of an idealised female correct. Usually I model the limbs and torso separately to make positioning them easier. I try to keep the same number of edges on each boundary to make welding the connecting edges together much simpler.



05 Get the correct topology At this stage I correct the posture of the character to make it easier to sculpt with. Straighter arms and spine, as well as relaxed shoulders, are all ideal. I also attach all of the elements from previous steps and tidy the geometry across the entire model. Make sure the polygons are equally distributed throughout the model, the triangles are removed or isolated to areas that won't be sculpted over, and that there are no open edges where there shouldn't be. The level of topology you need for a sculpt is fundamentally different to the topology required to achieve a well-deformed mesh. For example, the entire model should have the same density of faces throughout, whereas an animated model generally has more edge loops around the joints.

06 Use temporary models To help speed up the development process and to jump into the fun stuff sooner, I like to use temporary models for details that will be defined later in the sculpting process. Other than the head being brought in for reference, the best example for this project is the shoes. The heels that I add here quickly block out the shapes that will eventually be there. This also saves me a ton of time not worrying about modelling the boots right away. The key thing to keep in mind is to avoid the small details at first; get the bigger shapes blocked in and just keep refining.



07 Prototype with the ShadowBox ZBrush has a feature called ShadowBox, which can form a model out of a cube using masks. This is similar to cutting out models in real life using a printer. Going to Geometry> ShadowBox will approximate the geometry based on painted masks on each side of the ShadowBox cube. By painting information on each axis you are effectively cutting a model out of a block of material. Using this method I am able to shape the jetpack fins in a matter of seconds. The drawback here, though, is that this feature is destructive to the model's topology, meaning that it's only useful for sculpting and you may need to retopologise after major edits. Once you're happy with your edits, click ShadowBox again to return to the normal editing mode.

04 Block out your model with simple shapes – don't get caught up in the details

05 A good base mesh has equally distributed polygons to avoid errors when sculpting

06 Using temporary models can really help speed up the sculpting process

07 ShadowBox is a great feature for quickly prototyping hard-surface models

Create custom Alphas & layer on the details

Before starting a sculpt, I like to have a bank of assets that I can quickly bring into ZBrush for detailing. For this project, I'm using a few unique Alpha textures for bolts and connecting ports throughout the spacesuit. The great thing about this – and something that should be common practise – is that these Alphas can be saved into a library for future projects, ultimately saving you time later on.

Creating these textures is usually a quick process. Simply make a black-and-white texture (usually white is the influencing area) saved as a PSD or JPEG and import the texture into the Alpha panel in ZBrush. Alphas can be used with any brush combination; in this case I'm using them with a Standard brush, with DragRect stroke active and LazyMouse disabled.

You can also create a bank of models, like nuts, bolts, clasps and so on, that have universal use. These models can be applied to your 3D application and brought into ZBrush or applied to the model using the MeshInsert brush. The one issue with this workflow, however, is that the base model can't have any subdivisions when the MeshInsert brush is being used. It then becomes part of the model as a whole and cannot be controlled separately.

Sculpt the character

Build up your base mesh to achieve a high-resolution model

08 Shape the head A problem many artists face when sculpting females is that they overemphasise details when, really, the opposite is almost true. For idealised females it's safer to make details softer and subtle. Any blemish will stand out and, therefore, either needs to be avoided or selectively chosen (like a scar, mole or a tattoo). Here I spend more time modelling the base mesh and making sure that it subdivides cleanly.

09 Add some hair This character has a ponytail of heavy dreadlocks, so for the most part I mask off chunks of the hair and increase the mass using the Clay Buildup brush. I repeat this process for each major chunk of hair and then run over them with a Standard brush to create strands. Dreadlocks, however, are usually coarser due to many frayed hairs. To create this effect I use the Clay Buildup brush with a Spray stroke and an Alpha resembling a pinhole. To complete the hairstyle, I create separate strands modelled in 3ds Max. These are just a few bent cylinders bunched together, with the same detailing pass that is applied to the main hair.

08 Avoid excessive detailing when sculpting female faces. It will muddy up the model and make her seem a lot less fair-skinned

09 Layer the hair with the Clay Buildup brush and hone in on the finer aspects

10 Keep it simple: the forms need to be defined before the details

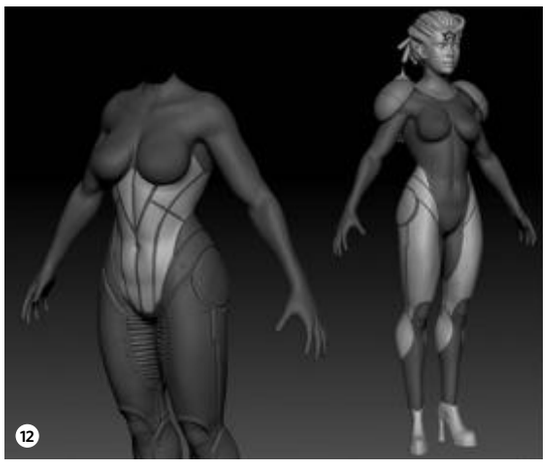
11 Patching over seams with separate models is a great way to hide open edges

10 Rough in the anatomy Next I rough in the broader anatomical details for the model. In general, this character is fully covered in skin-tight armour, so anything like finer muscle details, bones and wrinkles are covered up. I focus on the major forms here, defining the bigger shapes like the larger-scale muscle groups in the arms, legs and torso. This essentially acts as an underlying base for her suit and helps mark where the armour plates need to go. Much like the head, I mostly used Move and a low-intensity Standard brush for this part.

11 Cover seams & supporting geometry To hide the seam between the neck and body I create a thin collar to cover up the open edges. The model blends in well with the body-armour theme and helps hide the terminating edges in an elegant way. It also means it will bake down cleaner and enable the final asset to be handled in separate elements (body and head) without too much work going into painting out the seams and terminating edges properly.

12 Mask out the body armour Once the body is roughed in with major landmarks for the bone structure and musculature, I need to start the body armour. By hitting Ctrl you can access the Masking tool. This means that anything painted will be unaffected by geometry changes. To make the strokes crisper I hold down Ctrl again and enable LazyMouse in the Stroke panel. I then mark out the armour panels. Since this armour is skin-tight, I decide it's best to leave gaps in the armour around areas that will need to deform. This will help avoid any awkward stretching during the posing and animation stage.

13 Use deformations With all of the armour pieces masked out, it's time to push the panels out from the surface to help define the difference between them and the underlying spacesuit. Navigate to the Deformation tab and click on Inflat. With this enabled you can adjust the strength in a positive or negative direction either by manually adding a value or adjusting the slider. I use a value of +2, which is just enough to push them off the surface. The idea for this character is that the majority of the armour is a flexible-but-protective material that's attached to an airtight, softer suit. To help show the varying materials, I add tighter fold work in between the armour's panels.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13

12 To keep the mask clean when painting, make sure that LazyMouse is enabled within the Mask brush

13 Use Deformation>Inflat to push the panels off the model

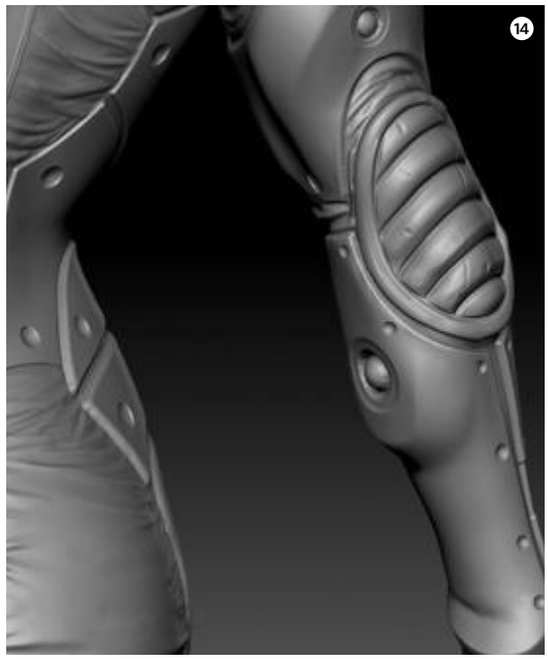
14 Use Clay Buildup and Trim Dynamic brushes to create heavier armour pieces

15 To be more practical, the hands are lightly armoured for flexibility and to avoid distortion

Try working with layers

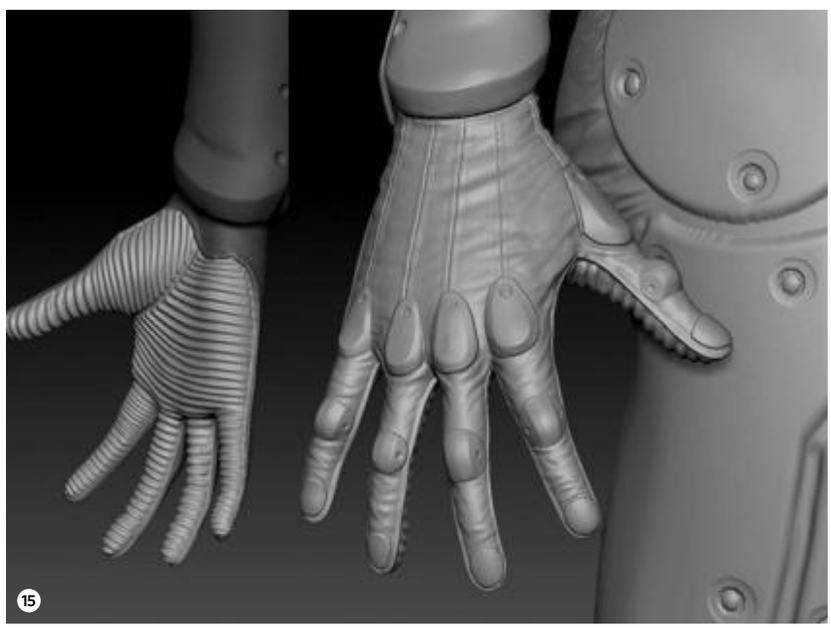
A great way to preserve your model from major – or possibly experimental – changes, is to create layers. At the highest subdivision level, navigate to the Layers panel and click the + icon. This will add a new layer that holds all your future changes until the Rec button is turned off. With Record disabled, you can also control the visibility of the layer to show the differences before and after the changes are made. Once you are happy with the information on the layer, you can either keep it around (and possibly add another layer to preserve that change) or bake it into the model itself.

In this project, the two key stages where layers are needed are in detailing the hair and the body armour. For the hair I was at first unsure if my technique would work, so using a layer enabled me to simply delete the changes without destroying the head model. For the skin-tight armour, I was also unsure whether its pattern would work. Since this was modifying a surface that was better kept clean, I wanted to use layers as a fail-safe to fall back on.


14

14 Build armour panels With the armour panels still masked out, I use Clay Buildup to add more depth in key areas. The aspects that I focus on generally follow the muscles underneath. This is mostly to deform the model properly, but also to make it relatable to the real world and for it to appear more streamlined. Specifically the calves, forearms and elbows are applied to. Once these areas are built up, I can then use the Trim Dynamic brush to help define the sharper edges.

15 Create the hands Using the same technique as before, I mask out the various elements of the hand. After separating the palm from the top of the hand, I next mask out the palm and create a ribbing effect by using the Standard brush with LazyMouse enabled. To help split the two halves I then run the Standard brush over the edge of the mask with the idea that the seam between the fabric and the rubber grip will be noticeable. Once this is finished, I can mask out the knuckles and push out the armour pieces using Clay Buildup and Trim Dynamic brushes. To get the right effect for the softer pieces I use a Standard brush with a low intensity for the fabric's folds.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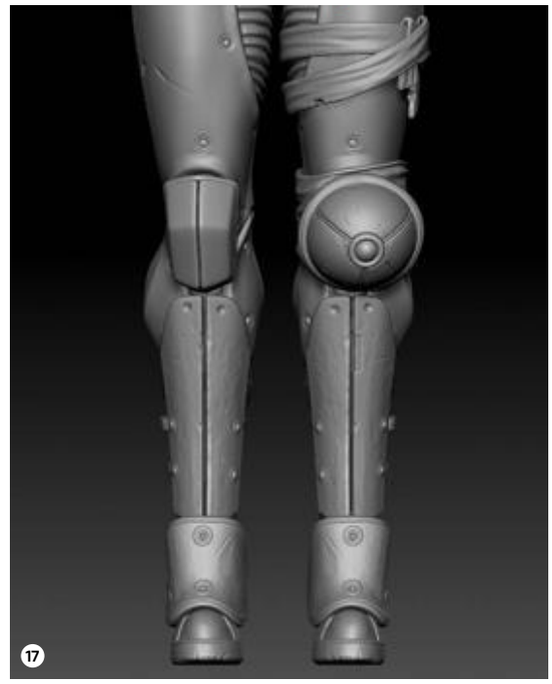
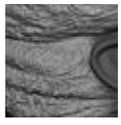
16 Hard-surface modelling With the majority of the sculpting done, I can switch back to 3ds Max to do some polygonal modelling. I export a reduced version of the body as a build to model over, then using Edge Extrusion I build out the armour panels: shoulder pads, neck guard, chest guard, jetpack and boots. With the models all created, I export them separately into ZBrush and subdivide them a few times. Beyond this, everything just requires surface details using Alphas.



17 Make the most of asymmetry As part of the hard-surface modelling phase, I create two separate kneepads and wraps for the upper-left leg and upper arm. These are subtle details that don't play a vital part to the overall model, but sell the idea that the gear she has acquired over time is mismatched and has seen battle. These are the kinds of additions that will bring a unique quality to your character designs.

Next issue: Game asset creation by Gavin Goulden



The final touches

Make the last refinements to the mesh

18 Add some wear-and-tear Once the majority of the sculpt has been created, make sure no major changes are going to happen; take feedback from friends and check this against your reference multiple times. Once satisfied, you can jump into the finer details that will help add personality to the subject on a second or third read. Since the character is a space explorer who has seen battle, I want to add some dents and scratches to her armour. Using the Standard brush at a high intensity, with LazyMouse enabled, I mark scrapes in selected areas. To help add edging that will bake down properly to a Normal map, I then bevel the edges using the Trim Dynamic brush.

16 I like to use traditional polygonal techniques to help keep hard-surface models clean

17 Add subtle details to the character to throw off the unrealistic symmetry

18 Applying isolated wear and tear features can bring more personality to a surface

19 NoiseMaker is used to create hair detail and pattern work on the jetpack

19 Apply NoiseMaker for surface details ZBrush's NoiseMaker plug-in is a quick and easy way to add finer surface detail to your models. Selecting Noise under the Surface tab will open up the Noise Editor, where you can increase the Strength, Scale and pattern being applied to your model. Once you are happy with the noise information on the model, you can confirm the change and return back to the ZBrush viewport. Once there, you can inspect your model further. If the detail isn't up to your standards, simply click Edit in the Surface panel and adjust the noise information as needed. The great thing about this tool is that the noise isn't instantly applied to your model, so in order to make it affect the geometry you will need to click on Apply to Mesh.

Watch your edge quality

When it comes to baking down high-resolution information into a Normal map, it's important to avoid incredibly sharp edges. In general, it's best not to use micro bevels (edges that are very close to one another with minor height differences) and to avoid pinching geometry in ZBrush. Instead, the softer edges that are created during subdivision are ideal for games. This is because the information will be translated into a straight line rather than a difference in height. When the low-resolution mesh captures information based on a ray cast, if the height differences are practically on top of one another, they translate as being flat in terms of depth. If the edge information is bolder and has more of a gradient from minimum to maximum, the information will be translated to a hard edge which, in reality, is always rounded.

With this in mind, it's best to use the Trim Dynamic brush to help create broader edges or use wider bevels in your 3D application that will translate properly when baking your Normal maps.

• DID YOU KNOW? • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Michael J. Eves

3DArtistonline

Username: evesy

Website www.michaeleves.com

Country Canada

Software used 3ds Max, V-Ray, Photoshop

> Final touches such as lens distortion, chromatic aberration and film grain can really help to sell the final image

Software used in this piece

3ds Max · V-Ray · Photoshop

> Light coming through the blinds created interesting shadows. The scene was dark – even using global illumination – so I faked bouncing light using V-Ray Plane lights, also tweaking the ISO and film speed. Basic understanding of photography really helps

Run-down Apartment

The inspiration for this work first began at a cottage in northern Ontario. The cottage was full of retro items that I wanted to model in 3D. As an artist I am fascinated by the play of light and I wanted to create an image that would reflect that and evoke curiosity. You can check out the complete rendered environment online at **http://tinyurl.com/3DAApartment**.

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Rig vehicles in Maya

Sunbeam Rapier Mark IV 2013

Jahirul Amin is a freelance rigger, animator and an associate lecturer at the NCCA in Bournemouth

Step by step

Easy-to-follow guides take you through the creation process

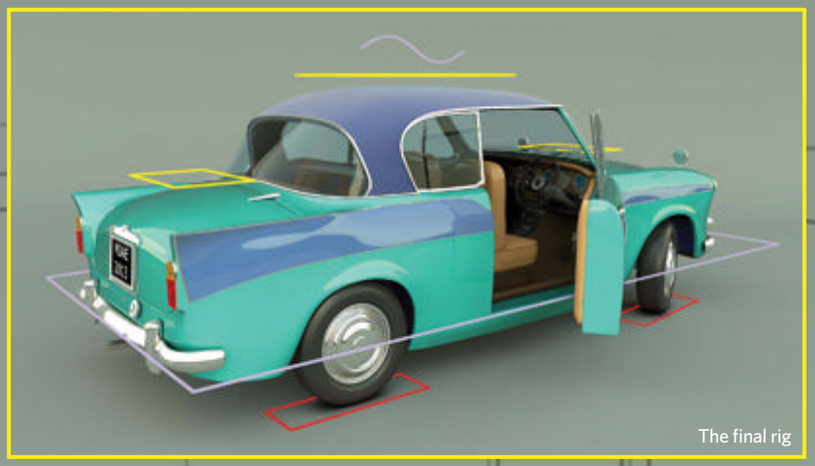
Artist info

Jahirul Amin

Personal portfolio site www.warpeaceandpixels.com
Country UK
Software used Maya
Expertise Jahirul is an expert animator and rigging genius

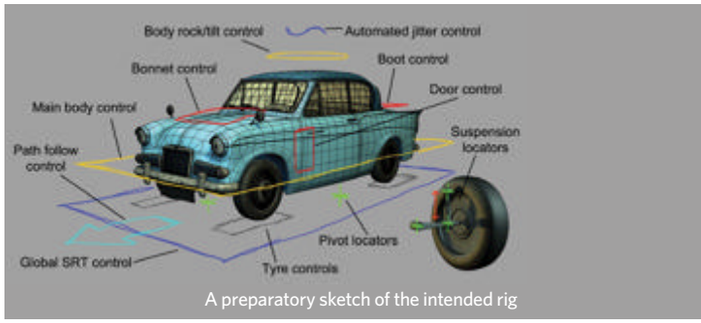
With the Disc

Tutorial files:
- Maya scene files
- Video tuition
- Tutorial screenshots



The final rig

Rig vehicles in Maya



A preparatory sketch of the intended rig

This issue we'll be creating the rig for the Sunbeam Rapier, which was modelled in issue 52. The scene files you'll need to follow the tutorial can be found with the disc or downloaded from **www.3dartistonline.com/files**.

The way I tend to approach rigging an inanimate object is to see the model as a character, or part of a character. Once the model and rig are in the hands of the animator, they will begin to give the model life and personality. As a rigger, I'm already imagining how that something is going to move.

Basically then, we're going to treat the car as one big reverse foot setup with a few bells and whistles thrown in for good measure. The car needs to tilt and shift in a similar way to a foot, so the pivot points will be arranged in the same sort of fashion.

A good rig is one that is fit for purpose, by which I mean it will be able to perform in the way required. During the tutorial we'll be adding a good few automated controls to help the animator, while also enabling the controls to be disabled so the animator can work on top. Essentially, the rig should provide the animator with the freedom to work as they choose and push the rig as far as desired.

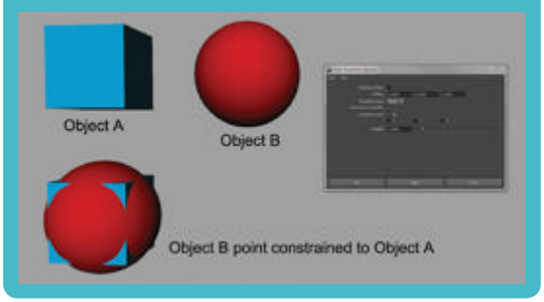
Let's consider some of those bells and whistles. We'll add a device to automatically rotate the wheels with the translation of the car. Another control will bring the kind of jitter that you'd expect to see as a car drives over a cobbled street. We'll also need to have the car follow a path. Finally, we'll give the animator the chance to add drag to the car. Just to reiterate what I feel is a crucial point: the animator will be able to disable all of the automated controls and animate by hand, if needed.

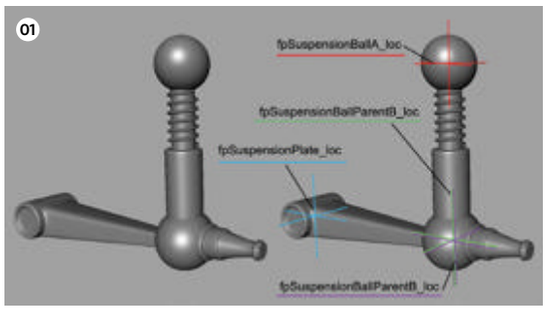
Aside from automated controls, we'll add a number of pivot locators around the car to enable us to tumble and rock it from the wheels upwards. We'll additionally give it suspension.

To create our rig, we'll use a range of connection methods; for example constraints, expressions, the Connection Editor and the Hypergraph. And that should be enough to unleash your inner geek.

Move objects into place

Throughout the rigging process, it will be important to make sure our objects' controls and locators are correctly placed. On many occasions, we will need to match the pivot of one object to another. To do this, I like to use point constraints. First select the object of the position you would like to match, Shift-select the object you want to move and go to Constrain>Point (Options). Uncheck Maintain Offset and hit Apply. Once the object is placed, delete the Constraint node living under it in the Outliner to break the connection. You can do this for orientation also, if need be.



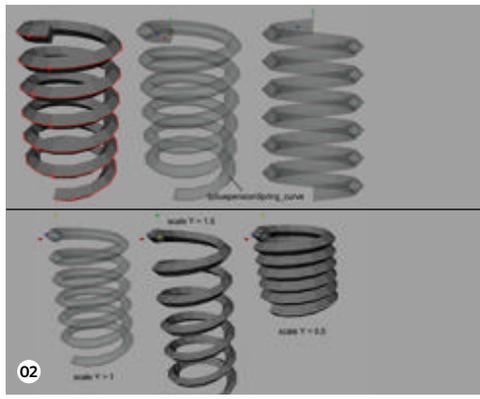


Check the suspension

Establish the correct levels for the car

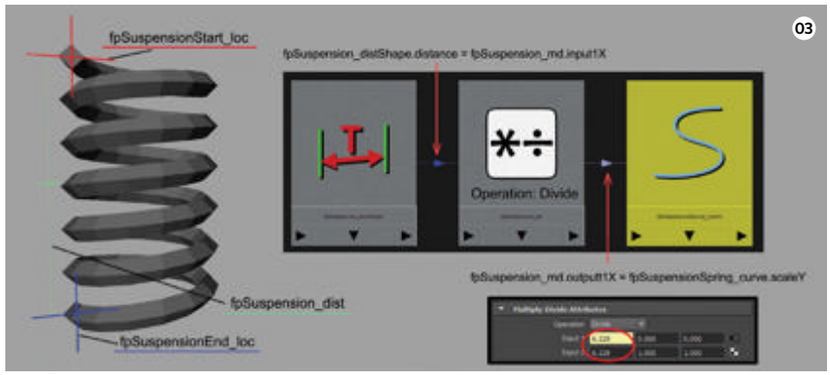
01 Create the suspension We will start by working on the front passenger suspension. Create four locators by going to Create>Locator. Rename them 'fpSuspensionBallA_loc', 'fpSuspensionBallB_loc', 'fpSuspensionBallParentB_loc' and 'fpSuspensionPlate_loc'. Now position fpSuspensionBallA_loc to the same place as fpSuspensionBallA_geo. Next move both fpSuspensionBallB_loc and fpSuspensionBallParentB_loc to the same place as fpSuspensionBallB_geo. Position fpSuspensionPlate_loc at the front end of fpSuspensionPlate_geo. Now select fpSuspensionBallA_loc, then Shift-select fpSuspensionBallB_loc and go to Constrain>Aim (Options). Set the Aim Vector to 0, 1, 0 and hit Apply. Select fpSuspensionBallB_loc, Shift-select fpSuspensionBallA_loc and again create an Aim constraint. This time set the Aim Vector to 0, -1 and 0. Now parent fpSuspensionBallB_loc under fpSuspensionBallParentB_loc. Select fpSuspensionBallParentB_loc, Shift-select fpSuspensionPlate_loc and go to Constrain>Aim. Make sure Maintain Offset is turned off and set the Aim Vector to 1, 0 and 0. Now Parent Constrain fpSuspensionBallA_geo to fpSuspensionBallA_loc, fpSuspensionBallB_geo to fpSuspensionBallB_loc, fpSuspensionPlate_geo to fpSuspensionPlate_loc and finally fpSuspensionRodE_geo to fpSuspensionBallParentB_loc.

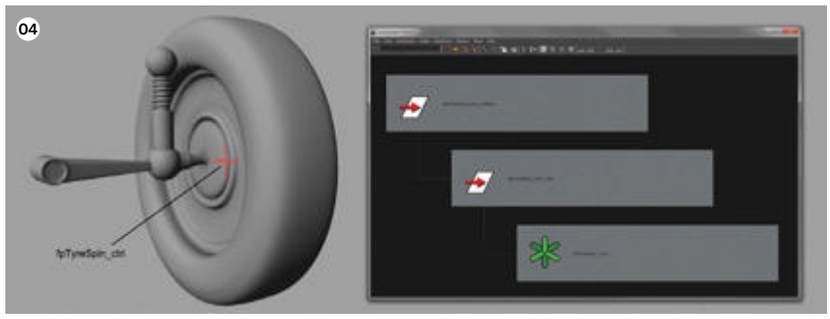
02 Include the spring Turn on Snap to Points and go to Create>CV Curve Tool (Options). Set the Curve Degree to 3 Cubic and begin creating a curve from the top to the bottom of the spring, snapping a new CV on each vertex. Once the Curve is created, turn off Snap to Points, rename the curve 'fpSuspensionSpring_curve' and go to Modify>Center Pivot. Now scale the curve to fit into the centre of the spring geometry and then go to Modify>Freeze Transformations. Now turn on Snap to Curve, make sure you are using the Translate tool and either hit the Insert key on the keyboard or hold down the D key and move the pivot to the topmost point on the curve. Now go to Create Deformers>Wire Tool. Select the fpSuspensionSpring_geo and hit Enter on the keyboard. Select the fpSuspensionSpring_curve and hit Enter again. Now, if you scale the curve in the Y axis, you should affect the geometry.



03 Squash & stretch Go to Create>Measure Tools>Distance Tool. First click at the root of the fpSuspensionSpring_curve and then click again at the end. Using Snap to Curve, make sure the locators are sitting right at each end of the curve. Rename the start locator 'fpSuspensionStart_loc' and the end locator 'fpSuspensionEnd_loc'. Also rename the Distance node 'fpSuspension_dist'. Parent fpSuspensionStart_loc under fpSuspensionBallA_loc and fpSuspensionEnd_loc under fpSuspensionBallB_loc. Select the fpSuspension_dist and hit the down arrow on the keyboard to pick-walk to its shape node, fpSuspension_distShape. Now go to Window>Rendering Editors>Hypershade and within the window click Graph>Add Selected to Graph. Next go to Create>General Utilities>Multiply Divide and rename the new node 'fpSuspension_md'. Select the fpSuspensionSpring_curve and go to Graph>Add Selected to Graph to bring it into the work area. Now connect the distance from the fpSuspension_distShape into the Input1X of the fpSuspension_md. Copy the same value that is in Input1X into Input2X and also set the Operation to Divide. Finally, connect the OutputX from the fpSuspension_md into the scale Y of the fpSuspensionSpring_curve.

04 Add some spin control To finish off the spring, Parent Constrain both the fpSuspensionSpring_curve and the fpSuspensionSpring_curveBaseWire to fpSuspensionBallA_loc. Now create a locator and rename it 'fpTyreSpin_ctrl'. Group it to itself twice by hitting Cmd/Ctrl+G, rename the topmost group 'fpTyretSpin_ctrl_offset' and the group below 'fpTyreSpin_ctrl_sdk'. Use the _offset group to position the control at the centre of the tyre. Now select fpTyreSpin_ctrl, Shift-select fpSuspensionBallParentB_loc and go to Constrain>Parent. Select fpTyreSpin_ctrl, Shift-select fpTyre_geo and again go to Constrain>Parent. We will use the Rotate X of the fpTyreSpin_ctrl to spin the tyre only.

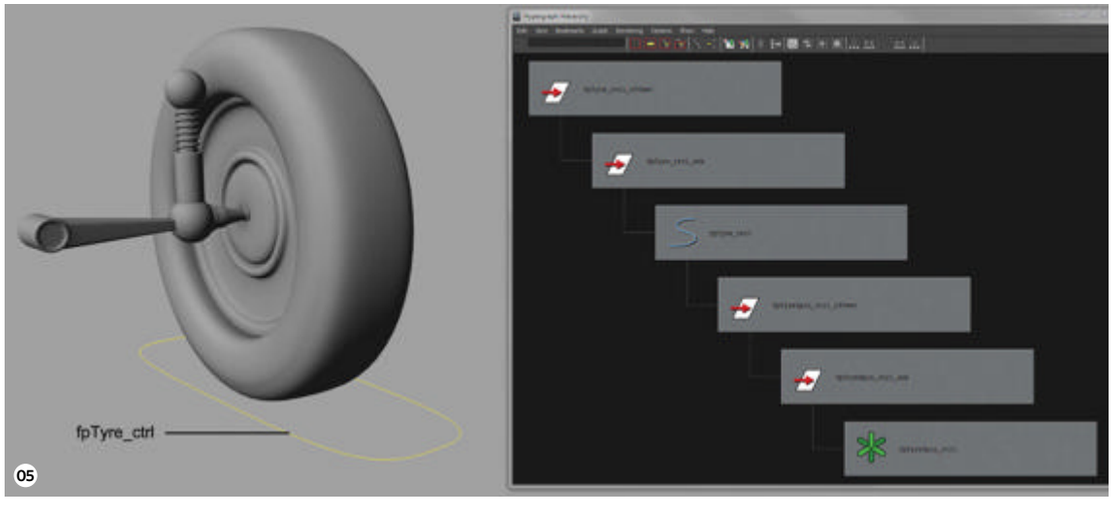




Define the controls

All of the controls will be made out of NURBS curves, enabling controls to be easily editable in Component mode. Please note well: once your control has been correctly placed, only edit its shape in Component mode. Every control will be grouped to itself twice to create a small hierarchy. The top node (_offset) will be used to position and orient the control. The next level down (_sdk) will be used to drive automated attributes, such as the jitter effects. The lowest level is the control curve (_ctrl), which the animator will use directly.

05 Create the main tyre control Create a NURBS circle and rename it 'fpTyre_ctrl'. With the control selected, hit Cmd/Ctrl+G twice to create the control hierarchy. Rename the topmost group 'fpTyre_ctrl_offset' and the next group down 'fpTyre_ctrl_sdk'. Select the fpTyre_ctrl_offset node, position it at the same place as the fpTyreSpin_ctrl but then pop a 0 into its Translate Y channel so it sits under the tyre. If you need to edit the shape to make it more easily selectable, go into Control Vertex mode and edit its shape. Now parent fpTyreSpin_ctrl_offset under fpTyre_ctrl. To tidy things up, select all the locators, the suspension curves, the fpSuspension_dist and the fpTyre_ctrl_offset then hit Cmd/Ctrl+G. Rename this new group 'fpSuspension_rig_grp'. In the same manner, create the suspension setup and controls for the remainder of the tyres. Create a NURBS circle and rename it 'fpTyre_ctrl'. With the control selected, hit Cmd/Ctrl+G twice to create the control hierarchy. Rename the topmost group 'fpTyre_ctrl_offset' and the next group down 'fpTyre_ctrl_sdk'. Select the fpTyre_ctrl_offset node, position it at the same place as the fpTyreSpin_ctrl but then pop a 0 into its Translate Y channel so it sits under the tyre. If you need to edit the shape to make it more easily selectable, go into Control Vertex mode and edit its shape. Now parent fpTyreSpin_ctrl_offset under fpTyre_ctrl. To tidy things up, select all the locators, the suspension curves, the fpSuspension_dist, the fpTyre_ctrl_offset and hit Cmd/Ctrl+G. Rename this new group 'fpSuspension_rig_grp'. In the same manner, then create the suspension setup and controls for the remainder of the tyres.



01 The position of the locators for the suspension

02 The curve and the wire deformer for the spring

03 Setting up the squash and stretch of the spring

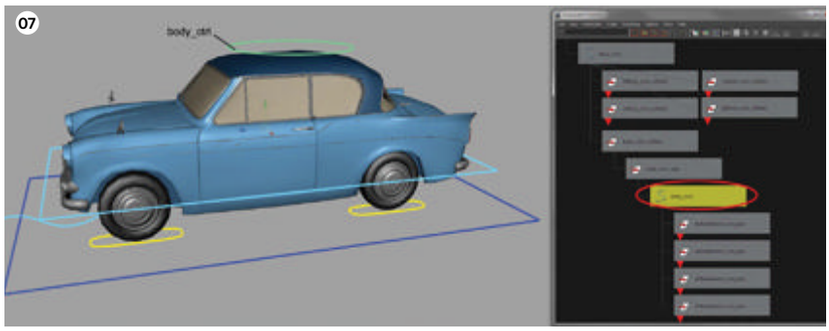
04 The basic setup for the tyre spin control

05 The hierarchy for the main tyre control

Rig the main body

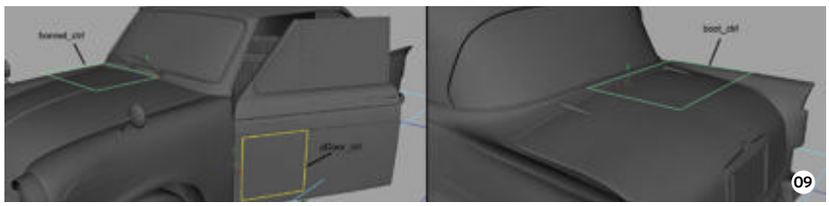
Continue to set up the main controls for the body of the car

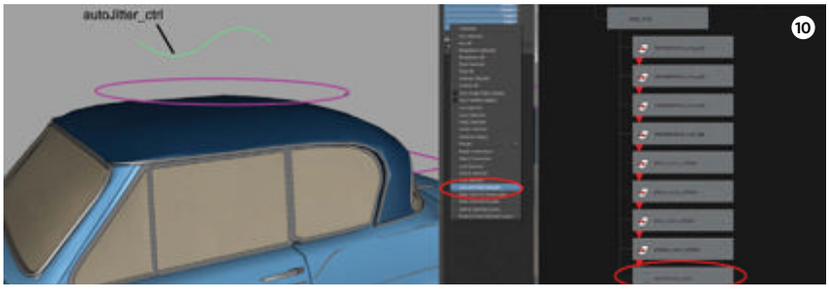
06 The main controls Using the CV Curve tool with its Curve degree set to 1 Linear, draw a square around the car. You can use Snap to Grids and draw down from the top view to get a clean rectangular shape. Rename the control 'main_ctrl'. Create another control using the CV Curve tool. This time make it a unique shape that can be easily read as a path follow control. Rename the control 'attachToPath_ctrl'. For both controls, make sure their pivots are at the world centre and then go to Modify>Freeze Transformations. Parent main_ctrl under attachToPath_ctrl. With attachToPath_ctrl selected, hit Cmd/Ctrl+G and rename that group 'main_ctrl_offset'. Create another rectangular control in the same manner as the main_ctrl but make it larger. Rename this control 'globalSRT_ctrl' and with it selected, hit Cmd/Ctrl+G twice. Rename the topmost group 'globalSRT_ctrl_offset' and the next group down 'globalSRT_ctrl_sdk'. Parent main_ctrl_offset under globalSRT_ctrl.



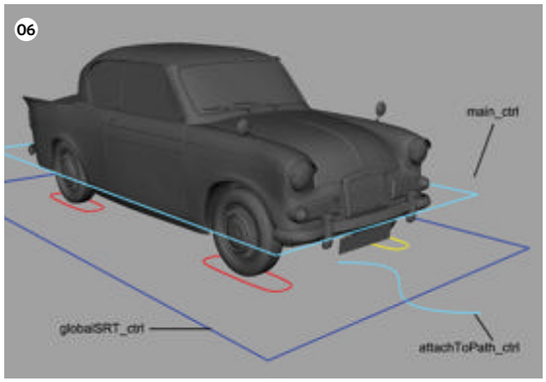
08 Add pivot locators Create six locators and rename them 'fPivot_loc', 'rPivot_loc', 'dPivot_loc', 'pPivot_loc', 'fWheelPivot_loc' and 'rWheelPivot_loc'. Position the fPivot_loc and rPivot_loc at either end of the car and at the centre of the X plane. Position the dPivot_loc and pPivot_loc on the outside of the tyres, either side of the car. Position fWheelPivot_loc and 'rWheelPivot_loc in between the front and rear tyres and centred to the X plane. Zero out the Translate Y on all the locators so they sit cleanly on the Y plane. Next parent rWheelPivot_loc under fWheelPivot_loc. Parent fWheelPivot_loc under pPivot_loc. Parent pPivot_loc under dPivot_loc. Parent dPivot_loc under rPivot_loc. Parent rPivot_loc under fPivot_loc. Then parent fPivot_loc under main_ctrl and finally parent all the xxTyre_ctrl_offset groups and the body_ctrl_offset under rWheelPivot_loc.

09 Bonnet, door & boot Create three new controls and call them 'bonnet_ctrl', 'pDoor_ctrl', 'dDoor_ctrl' and 'boot_ctrl'. As before, group each control to itself twice to create the _sdk and _offset nodes. Use the _offset nodes to place the controls. When the controls are placed, Parent Constrain bonnet_geo to bonnet_ctrl, pDoor_geo to pDoor_ctrl, dDoor_geo to dDoor_ctrl and boot_geo to boot_ctrl. Take all the _offset groups for the controls and parent them under body_ctrl.

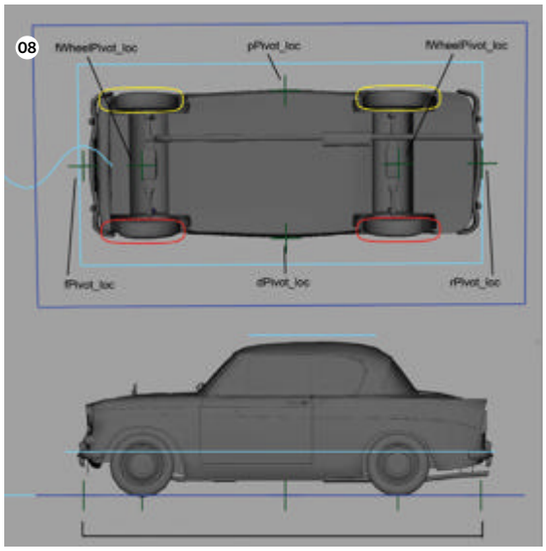




10 The jitter control Create a new control curve and name it 'autoJitter_ctrl'. Don't create the _sdk and _offset setup for this, as it will just be a placeholder for some custom attributes. Position the control above the body_ctrl and parent it under the body_ctrl. Highlight all the Translate, Rotate and Scale attributes in the Channel Box and go to Channels>Lock and Hide Selected.



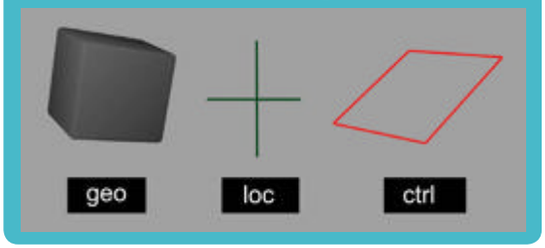
07 Adjust the body control Create a new NURBS circle and rename it 'body_ctrl'. Group it to itself twice, rename the topmost group 'body_ctrl_offset' and the next group down 'body_ctrl_sdk'. Select the body_ctrl_offset and position it so it's in the centre of the car. Parent Constrain mainBody_geo_grp under body_ctrl and also parent all the xxSuspension_rig_grp nodes under body_ctrl. Next parent body_ctrl_offset under main_ctrl.



Naming conventions

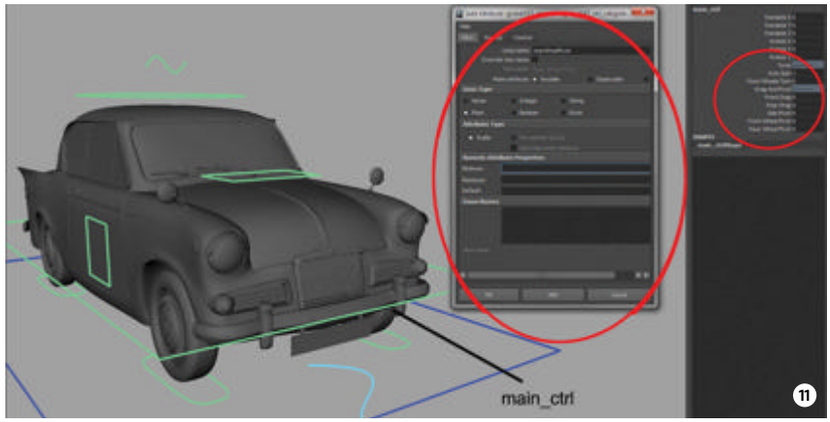
Before beginning a project, I like to establish some naming conventions that will be used throughout. This will help ensure consistency as well as clarity for all involved. Here is a breakdown of some of the naming conventions used in this tutorial:

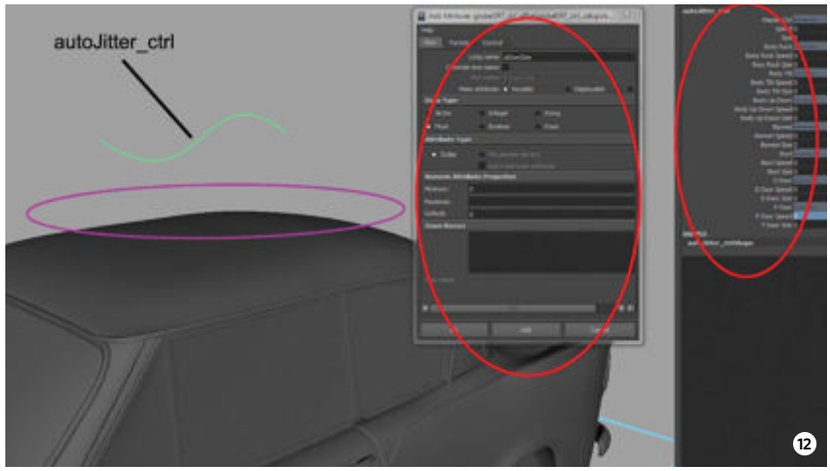
geo = geometry, ctrl = control, loc = locator, grp = group, f = front, r = rear, d = driver, p = passenger.



Use automated attributes

Give your animator some toys to keep them happy

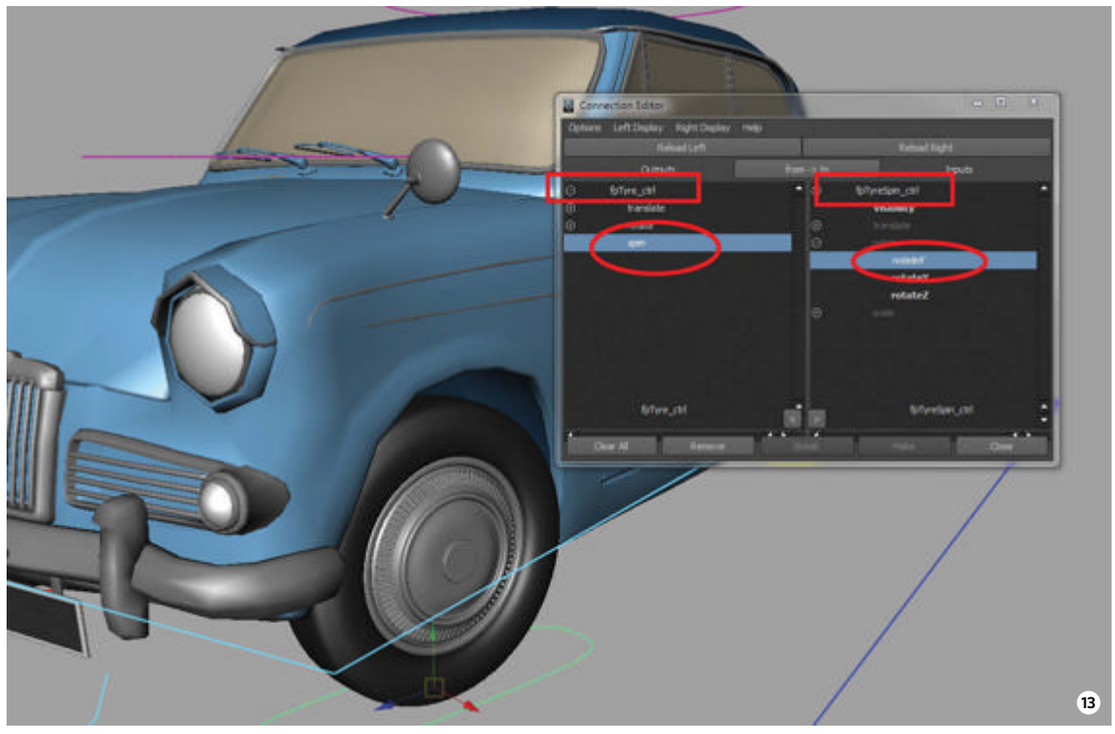




11 Add extra attributes Select the main_ctrl and go to Modify>Add Attribute. Create an attribute called 'tyres' and set its Make attribute to Displayable. This will act as a Divider. Now create an attribute called 'autoSpin', set its Make attribute to Keyable and give it a Data Type of Integer. Set its Minimum value to 0, its Maximum to 1 and its Default value to 1. Add another attribute and call it 'frontWheelsTurn'. Make it a Data Type of Float and leave its Min/Max parameters empty. Create another Divider and call it 'dragAndPivot'. Now create the following attributes with a Data Type of Float and leave the Minimum, Maximum and Default values empty: 'frontDrag', 'rearDrag', 'sidePivot', 'frontWheelPivot' and 'rearWheelPivot'.

12 Apply auto-jitter attributes Select the autoJitter_ctrl and go to Modify>Add Attribute. Again, you'll need to create a Divider attribute and call it 'masterCtrl'. Next create two attributes called 'speed' and 'size' with a Data Type of Float and a Minimum value of 0. Another Divider next, this time called 'bodyRock' followed by another two attributes called 'bodyRockSpeed' and 'bodyRockSize' with a Data Type of Float and a Minimum value of 0. Continue to create the following Dividers: bodyTilt, bodyUpDown, bonnet, boot, dDoor and pDoor. In between each of those Dividers, create the following attributes using a Float Data Type with a Minimum value of 0: bodyTiltSpeed, bodyTiltSize, bodyUpDownSpeed, bodyUpDownSize, bonnetSpeed, bonnetSize, bootSpeed, bootSize, dDoorSpeed, dDoorSize, pDoorSpeed and, finally, pDoorSize.

13 Set up the tyres Select the fpTyre_ctrl and go to Modify>Add Attribute. Call the attribute 'spin' and give it a Data type of Float. Leave the Minimum, Maximum and Default values empty. Next highlight the Rotate X attribute in the Channel Box and go to Channels>Lock and Hide Selected. With fpTyre_ctrl still selected, go to Window>General Editors>Connection Editor. Now select fpTyreSpin_ctrl and click Reload Right. Connect the spin in the left column to the Rotate X in the right column and do the same for the remainder of the tyres.



06 The main controls in place

07 The body control with its pivot at the centre of the car

08 The locators used for the pivoting of the car

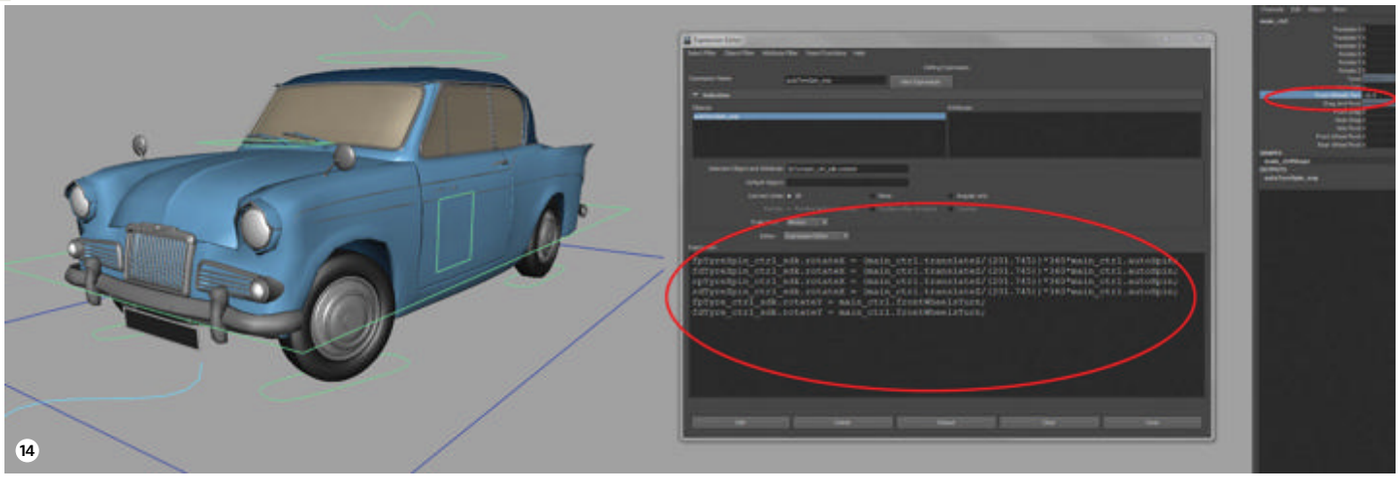
09 The door, bonnet and boot controls in action

10 Locking and hiding the transformation channels for the autoJitter_ctrl

11 Use custom attributes to add drag and pivot

12 Further custom attributes for automated jitter effects

13 Using the Connection Editor to control the spinning animation of the tyres



14 Achieve automatic wheel spinning To have the wheels spin automatically with the forwards and backwards translation of the car, go to Window>Expression Editor and create the following expression:

```
fpTyreSpin_ctrl_sdk.rotateX = (main_ctrl.translateZ/(201.745))*360*main_ctrl.autoSpin;
fdTyreSpin_ctrl_sdk.rotateX = (main_ctrl.translateZ/(201.745))*360*main_ctrl.autoSpin;
rpTyreSpin_ctrl_sdk.rotateX = (main_ctrl.translateZ/(201.745))*360*main_ctrl.autoSpin;
rdTyreSpin_ctrl_sdk.rotateX = (main_ctrl.translateZ/(201.745))*360*main_ctrl.autoSpin;
fpTyre_ctrl_sdk.rotateY = main_ctrl.frontWheelsTurn;
fdTyre_ctrl_sdk.rotateY = main_ctrl.frontWheelsTurn;
```

Rename the expression 'autoTyreSpin_expr'.

Diameter x Pi = circumference

To find out the circumference of the wheel, go into the side view and go Create>Measure Tools>Distance Tool. Now hold down V on the keyboard and point-snap the first locator to one side and the second locator to the other. Smooth out the tyre by hitting the 3 key and then slightly move the locators in, if needed. Now multiply the value created by the distance tool by 3.1415 and we have the circumference to use for our expression.

15 Drag, pivot & auto-jitter expression To set up the drag and overlap, create the following expression:

```
fPivot_loc.rotateY = main_ctrl.frontDrag;
rPivot_loc.rotateY = main_ctrl.rearDrag;
pPivot_loc.rotateZ = min(main_ctrl.sidePivot,0);
dPivot_loc.rotateZ = max(main_ctrl.sidePivot,0);
fWheelPivot_loc.rotateX = main_ctrl.frontWheelPivot;
rWheelPivot_loc.rotateX = main_ctrl.rearWheelPivot;
```

rename this expression 'dragAndPivot_expr'

Finally, create another expression for the jitter attributes, like so:

```
float $bodyRockSpeed = autoJitter_ctrl.bodyRockSpeed*autoJitter_ctrl.speed/10;
float $bodyRockSize = autoJitter_ctrl.bodyRockSize*autoJitter_ctrl.size*.5;
body_ctrl_sdk.rotateX = sin ((frame*$bodyRockSpeed))*$bodyRockSize;
float $bodyTiltSpeed = autoJitter_ctrl.bodyTiltSpeed*autoJitter_ctrl.speed/10;
float $bodyTiltSize = autoJitter_ctrl.bodyTiltSize*autoJitter_ctrl.size*.5;
body_ctrl_sdk.rotateZ = sin ((frame*$bodyTiltSpeed))*$bodyTiltSize;
float $bodyUpDownSpeed = autoJitter_ctrl.bodyUpDownSpeed*autoJitter_ctrl.speed/10;
float $bodyUpDownSize = autoJitter_ctrl.bodyUpDownSize*autoJitter_ctrl.size*.5;
body_ctrl_sdk.translateY = sin ((frame*$bodyUpDownSpeed))*$bodyUpDownSize;
float $bonnetSpeed = autoJitter_ctrl.bonnetSpeed*autoJitter_ctrl.speed/10;
float $bonnetSize = autoJitter_ctrl.bonnetSize*autoJitter_ctrl.size*.5;
bonnet_ctrl_sdk.rotateX = sin ((frame*$bonnetSpeed))*$bonnetSize;
float $bootSpeed = autoJitter_ctrl.bootSpeed*autoJitter_ctrl.speed/10;
float $bootSize = autoJitter_ctrl.bootSize*autoJitter_ctrl.size*.5;
boot_ctrl_sdk.rotateX = sin ((frame*$bootSpeed))*$bootSize;
float $dDoorSpeed = autoJitter_ctrl.dDoorSpeed*autoJitter_ctrl.speed/10;
float $dDoorSize = autoJitter_ctrl.dDoorSize*autoJitter_ctrl.size*.5;
dDoor_ctrl_sdk.rotateY = sin ((frame*$dDoorSpeed))*$dDoorSize;
float $pDoorSpeed = autoJitter_ctrl.pDoorSpeed*autoJitter_ctrl.speed/10;
float $pDoorSize = autoJitter_ctrl.pDoorSize*autoJitter_ctrl.size*.5;
pDoor_ctrl_sdk.rotateY = sin ((frame*$pDoorSpeed))*$pDoorSize;
```

Rename this expression 'autoJitter_expr' and you should be good to take the car out for a spin. Happy rigging!

14 This is the expression you need to create the automatic spinning of the tyres when the car is translated

15 These are the expressions used for the pivot and jitter controls. Find the image on the disc for more detail

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Step by step

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Expertise Concept art for films and games, including creatures, characters and environments

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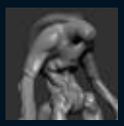
"Learn how to create 3D cinematic concept art that's good enough for the movies"

Justin 'Goby' Fields is a concept artist specialising in creatures, characters and environments

Over these steps we are going to be jumping into ZBrush with plenty of reference to create a cinematic creature concept. In production, ZBrush is an extremely valuable tool. By spending time creating a sculpt, rather than drawing, you're able to create an asset that can be reposed, textured and altered very quickly. This results in multiple angles and visuals all within a single 3D package and means you're able to produce an orthographic view in seconds, rather than days.

We'll use DynaMesh along with standard ZBrush tools to build up all the creature's kinks, wrinkles, muscles and other details. The point of interest of *The Wraith* is its menacing head, complete with a sizeable set of teeth, so we'll only focus on this once the main body is complete.

ZBrush is also a great tool to use in conjunction with Photoshop, where you can achieve great-looking results by painting on top of your renders. This is where we'll complete post-production work on the model.



Establish a base

Build your concept using simple shapes & ZSpheres

01 Use ZSpheres as a starting point After gathering reference and figuring out what the main goals are for the concept, we'll start building the creature using ZSpheres. Sometimes in production it may be faster to begin with a preset base mesh from a previous sculpt, just to speed things up. Here we'll be starting from scratch to see what the overall look will be. Once we have the proportions right, we can break the work into separate SubTools and then move to DynaMesh.

02 Reference is key Keep a collection of images on another monitor to constantly refer to and keep the design in check. Nature is the greatest tool in any artist's arsenal, so spend some time studying photos and examining what catches your eye. For this project, observing insects and their various body parts is particularly useful.

03 Don't rush things We'll need to spend a lot of time detailing the head, so we'll save this until last. At this stage, staying at a lower subdivision level will help us make major design changes fast without the sculpt getting too loose. Try to keep major elements as separate SubTools so you can really subdivide and get some great details.

01 Using DynaMesh with ZSpheres is an efficient way of designing

02 After gathering reference photos, compile them into one image in Photoshop to keep on a second screen

03 Take time to look at real-world reference. This will always bring your concept to life

Concept

With *The Wraith* I wanted to focus on an insect-style monster with elongated limbs and a multi-jointed mouth to give him some intimidating features. Adding more aggressive shapes also helps create a frightening alien concept.

With the Disc

Tutorial files:
- A ZTL file
- Tutorial screenshots

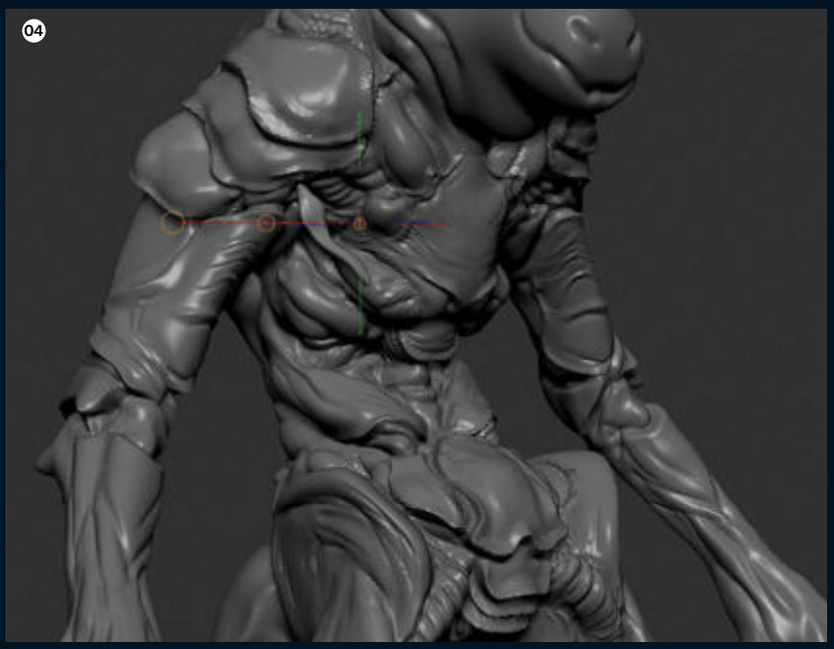
Learn how to

- ☑ Take your concept art to a new level
- ☑ Use ZBrush and Photoshop for professional results

Create a dynamic concept

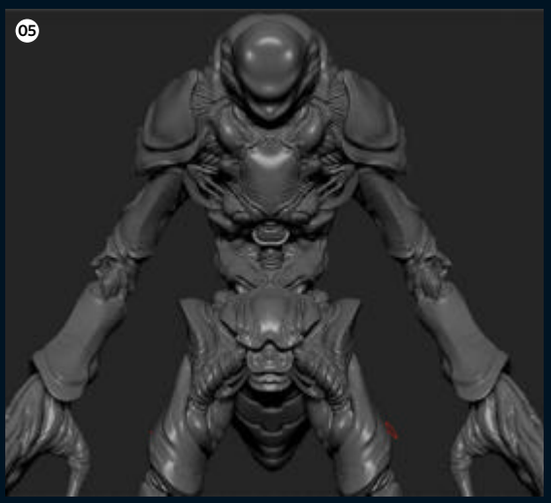
Take your time, choose your plan of attack and stick to it

04 **Develop shapes & form** Going up in subdivisions now and looking at the references, we'll use the Clay Buildup brush to establish the broad outline of the creature. Once this is done we can really start to plot out the concept, and smooth and cut into the flesh of the model. When working as part of a team, make sure you consider the artist you'll be handing over to. Digital is limitless, but it's worth keeping in mind that someone else may need to fit inside your design. For most of the organic sculpting we'll use variations of the Dam Standard brush plus various stock Alphas in ZBrush. You can also use the Standard and Clay Buildup brushes at a very low pressure to blend in and out of shapes.



06 **Begin work on the head** After adding the head we'll use DynaMesh and the SnakeHook brush to pull out some interesting shapes. Following the same steps we used on the body, quickly lay out the shapes and detail them. We can add eyes early on, then test different shapes and sizes to see what looks best. After these are in place, make sure that the underlying shapes support the sockets to give the head a bit more character.

05 **Tighten up the graphics** Now that we have a lot more digital clay to push around, we can really dive into some serious detail. Using some of the same techniques from the previous step, we'll continue to refine detail and define the interesting shapes. We can also start laying the groundwork for wrinkles, edges, creases and apexes. The final pass of detail will make your work much easier.



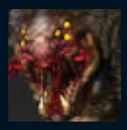
Sculpting heads

Depending on the concept, I like to wait and leave the detailed sculpting of the head until last. Sometimes I also take what I have so far, drop it in Photoshop and do quick paint-overs to get a few variations. This way I can see which direction I want to take the final sculpt in.

04 Change the background colour from time to time, as it will help you to see mistakes

05 Now it's time to start putting in all the detail with the Dam Standard brush

06 Try using multiple SubTools to maintain functionality and options for posing later



Build up the features

Apply details & choose an active pose

07 Layer on textures & fine detail Try to keep your design grounded with areas of rest and subtle textures. Experimenting with stock Alphas and different brushes in ZBrush, as well as pressure, is a really great way to learn just what the tools can offer a project. Using LightCaps to see how light is affecting the surface of your creature may also affect some of your design decisions.

Save time with Alphas

It's worth spending time making and collecting Alphas. Pixologic has built a large collection of stock Alphas into ZBrush to choose from already, but it's also very easy to use Photoshop to build up your own collection for your personal sculpting needs. To create Alphas in Photoshop, simply create an image at 1,024 x 1,024 pixels and desaturate it to get a high-contrast, black-and-white image. If the image has edges, you may want to darken these gradually with a soft round brush – this will make it easier to work with in ZBrush. Simply save your Photoshop image as a JPG or PSD and import it into ZBrush through the Alpha palette.

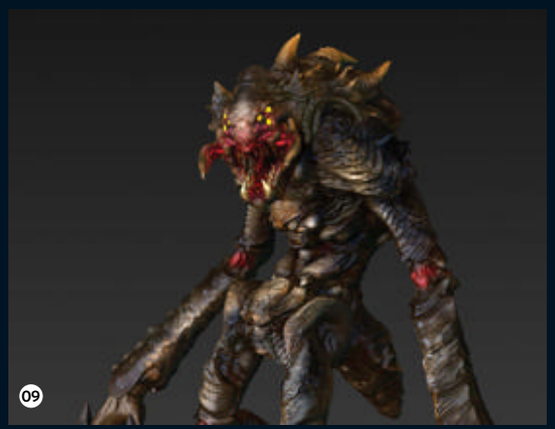
08 Play with tonality Colour can drastically change how your design is perceived. Try choosing a flat colour and airbrushing variations in to slowly build up the tones. Masking out the cavities and adding some dirt always helps to make your designs 'pop' as well.

07 This is where having custom Alphas and great references to look at are key to your concept arsenal

08 Looking at nature and how the colours blend on real animals will help you make more believable concepts

09 You don't always have to go big and bold on the pose – subtle can speak volumes too

10 Balance out the art and make slight variations so the viewer doesn't notice that it's been sculpted symmetrically



09 Pose the character Since a stagnant pose is a good way *not* to get your design picked by clients, we're going to add a slight variation. Usually it's a safe move to turn the head slightly and shrug the shoulders to mimic a bit of action. Using the Transpose Master plug-in here is a godsend, as this will keep all your SubTools in line with the model while you pose it. Hit the TposeMesh button, then after posing hit the Tpose>SubT button and ZBrush will align all of your SubTools with the posed mesh.

10 Turn off Symmetry At this point we can add further detail without the Symmetry function turned on to give the design some love. Get in there and add various details and wrinkles. This step helps make your design unique by adding variation, so take the time to really consider what you're applying where and always keep your goals in mind.

11 Choose your angle Get ready to start the composition by finding your favourite angle and locking that in the camera view via the ZAppLink properties. Some of your details will inevitably get lost in the view that you choose. However, if you need a different pose, all you have to do is repose and re-comp, rather than go back to re-sculpt detail that isn't there. Having detail in there and not needing it is better than needing and not having it.

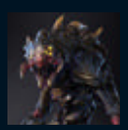
11

DynaMesh means freedom

Using DynaMesh in conjunction with extractions really frees up a lot of technical modelling issues and enables limitless creation possibilities. Pixologic has really broken the creative barrier with this solution, as well as the Insert brushes. Using these in production has made me a faster artist and has provided assets for the pipeline that can be used over and over again. Seeing how a practical design studio builds and replicates props has really opened up the worlds of kit-bashing and production modelling to me. Experience in reusing assets and templates in the graphic-design field has helped a lot as well.

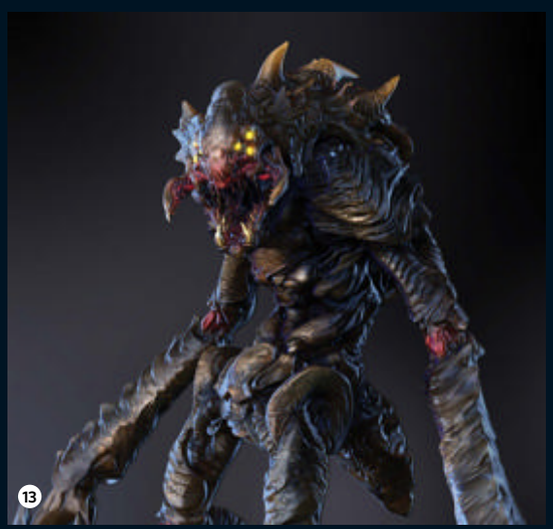
12

12 Render your creature After establishing the lighting and BPR settings, we'll begin rendering out the passes for post. We'll get the basic passes out of the way so we can play with some options for use in Photoshop. After this we'll get various light passes for fill and rim lights.



Bring it to life in Photoshop

Move to post-production and refine your creature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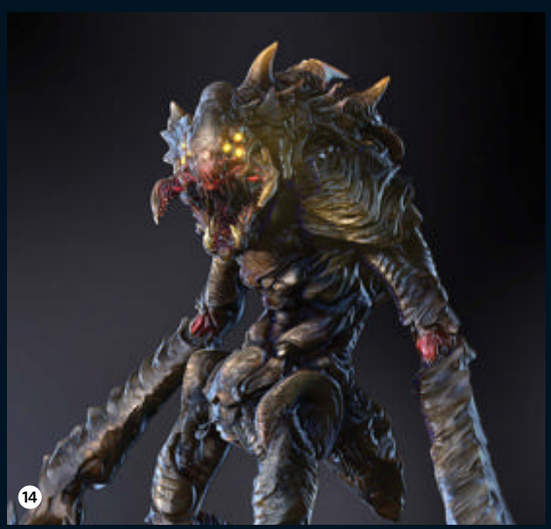
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13 Final composition When you have all of your render passes, take them into Photoshop and lay them on top of one another. Putting the flat model pass first, we can begin experimenting with blending layer options. This can vary with every piece, so use your artistic eyes and see what works best.

14 Add some atmosphere Painting in Photoshop now, this is another fun stage of the process. In this step we can drop in a few gradient spotlights to mimic the light setup and blend the alien into the background. At this stage you can also opt to drop a photo into your backdrop – just remember to match the perspective of your character.

11 Take your time and choose an angle that really shows off the design work you have done

12 These are the passes that the BPR render will provide – you can always do more experimentation later

13 Everything comes together after you lay in some painting and atmosphere on top of your render

14 If your goal is to concept a character, then make the background subtle. You're looking to sell your design, not the background, so anything else is distraction

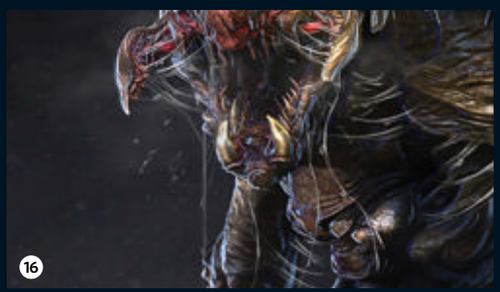
15 Master using adjustment layers and you'll be cranking out high-quality images in no time

16 The best way to learn these final steps is through experimentation – that and having fun!

17 Your finishing touches are usually personal preferences. These will give your concept its own unique style

15 Adjust with layers Being confident in Photoshop will help at this point as it's key to make changes in a non-destructive way. Using masks and adjustment layers is vital in production, as this way the changes aren't permanent and each can be developed to suit your art director's various demands. Another valid concern is that you may not be the only one working on the piece, so make it easy to edit, label those layers and keep it clean. Because you have to keep things organised and non-destructive, you will probably end up with a few hundred layers while building up your post effects and painting on top of your render.

16 Add final details Now we can start painting in some detail work using photo overlays of textures. Complete some final touchups and effects, but take the time to blend everything properly. The time you spend at this level really ties the piece together.



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WE INTERVIEW JUSTIN FIELDS
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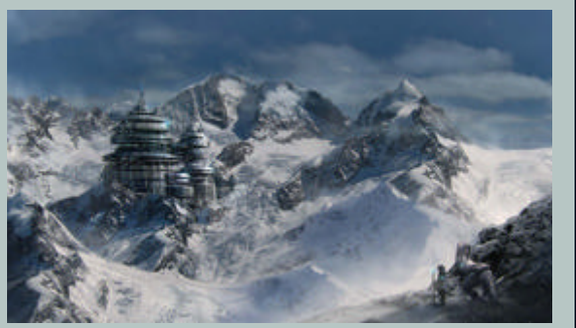
17 Make the finishing touches Now we can add in a small vignette and a little chromatic aberration to help prevent the creature from looking like a 3D render. We can also add a little noise to break up the image.

Artist Showcase

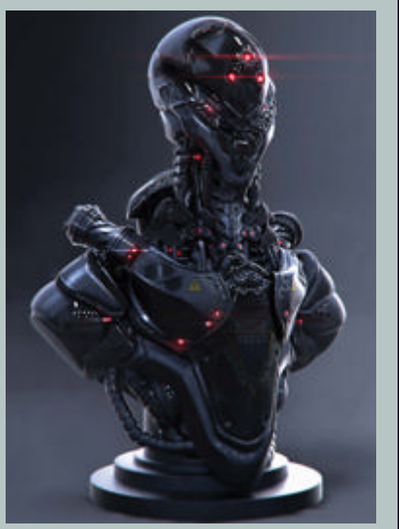
Justin 'Goby' Fields

A concept artist and graduate from the Gnomon School of Visual Effects, Justin Fields currently works in the film and videogame industries. He has worked for such studios as Amalgamated Dynamics, Imaginary Forces, the Aaron Sims Company, as well as Digital-Tutors and several other clients. When he isn't working, he enjoys watching films and playing with his three lovely dogs.

Alien Smile **ZBrush, Photoshop (2012)**
A personal work made when experimenting with shapes and ZBrush techniques



Hutt Palace on Hoth **ZBrush, Photoshop (2012)**
For this image he wanted to integrate ZBrush into the techniques he uses for his environment-painting pipeline



Hmmzt **ZBrush, Photoshop (2013)**
A recent personal work. This bust was completed in ZBrush with post work in Photoshop

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

TAKE YOUR 3D TO THE MAX

HARNESS MAXON'S ALL-POWERFUL CINEMA 4D R14 WITH A PERFECT PLATFORM: THE DELL PRECISION T7600 WITH AN AMD FIREPRO W8000

The Studio edition of CINEMA 4D R14 is the top version in the range, with all the features of Prime, Visualize and Broadcast, plus more advanced tools

Creating sophisticated 3D animation requires a careful combination of hardware and software. You need feature-rich software to provide the options necessary for realistic three-dimensional models and animations. These in turn necessitate a powerful workstation with specialised graphics hardware. In fact, creating 3D content is one of the most intensive tasks you could ever ask a computer to perform. However, there are three products that will work together perfectly: MAXON CINEMA 4D R14 software with the Dell Precision™ T7600 workstation and an AMD FirePro™ W8000 graphics card.

CINEMA 4D is a heavyweight in the business, with a history dating back more than 20 years. The range of features it offers is phenomenal, while the latest release of the software has brought new sculpting tools and enhanced dynamics, including aerodynamics.

The Dell Precision T7600 is the perfect partner for CINEMA 4D. This workstation sports a pair of the latest Intel Xeon E5-2687W processors that are currently the most powerful on the market. Running at 3.1GHz and with eight cores apiece, these processors feature Turbo Boost and Hyper-Threading Technology. These provide the best capabilities, whether you need single-core or multi-threaded performance. Even better, Dell has partnered the Xeons with a massive 128GB of DDR3 memory.

Rounding off the specification, the FirePro W8000 is the latest professional OpenGL accelerator from AMD. It boasts a whopping 1,792 stream processors, runs at 900MHz and even contains a very healthy 4GB of GDDR5 memory. It also features high-speed PCI Express 3.0 for the fastest data transfer available in professional graphics today. All this means it has plenty of grunt for rendering real-time 3D and will be great for OpenCL-enabled tasks as well, which includes certain specialised renderers.

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THE POWER OF CINEMA 4D R14

Action-packed 3D software to bring your ideas to life

As well as the sculpting tools, enhanced dynamics and a Global Illumination feature, CINEMA 4D R14 has a wealth of additional new features. It can create plastic deformations, breakable springs and offers a Camera Calibrator so you can integrate 3D elements into photographs. The camera morphing and motion facilities let you blend seamlessly between different camera angles. There are new shaders for wood, weathering, normalising, and subsurface scattering has also been enhanced significantly. You can create Radiosity maps and export to NUKE with a Position Pass render, while usability has been enhanced through overhauled snapping with new guides and workplanes. The user interface for the XPresso scripting system has been improved too.

WHAT'S NEW IN CINEMA 4D R14?

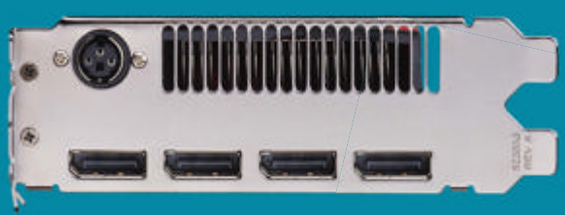
The latest version of CINEMA 4D is packed with features to really stretch your hardware, with the new sculpting tools enabling you to turn your models into digital clay. You can subdivide your model's geometry to gain a level of detail and then use a range of tools to pull, smooth, flatten, cut and pinch the surface. You can work at different levels of detail as well, using Symmetry options, stamps, stencils and masks to create highly complex organic forms. Each tool has unique Size and Pressure options that can be linked to a graphics tablet. Sculpting can be highly memory-intensive, but the T7600's 128GB of RAM will keep your workflow smooth.

CINEMA 4D R14 also has some new physics abilities, with the Dynamics system now including aerodynamics alongside rigid- and soft-body physics, so you can simulate the effects of air currents with floating feathers and gliding leaves. There's also a highly sophisticated cloth-simulation system that enables you to vary stiffness, friction and stretching.

The lighting system includes a Global Illumination setting, which calculates light that bounces between objects. It can also use High Dynamic Range sky as part of this calculation. With lighting playing such an important part in realism, CINEMA 4D can produce scenes with a new level of believability and highly sophisticated caustic effects.

The AMD FirePro W8000 is more than a match for these powerful content-creation features. The huge haul of shader units provides 1.8 billion triangles-per-second of geometry performance and 3.23 TFLOPs of compute power. The generous 4GB of frame buffer runs at 176GB per second, providing phenomenal performance for accessing high-resolution texture files.

The W8000 also supports AMD's Eyefinity and features four DisplayPort connections, meaning it can accommodate an array of up to four monitors, all containing 3D-accelerated viewports for an unparalleled desktop workspace. You can set your main viewport to appear on one display, the tool windows on another and still have display outlets left over for the other applications you may need to keep a close eye on.



With four DisplayPort connections, the AMD FirePro W7000 and W8000 support Eyefinity arrays with up to four fully accelerated displays and with resolutions up to 4K x 2K each. This enables a truly huge workspace

GIVE IT SOME FIRE!

Take a giant leap forwards with the new AMD FirePro W-Series of graphics cards

The W-Series is the latest generation in AMD's award-winning line of FirePro graphics cards. There are currently four cards in the range, with the W5000 being the entry-level model. This is a bit of a misnomer, however, as it still sports 2GB of GDDR5 memory, 768 stream processors and 102GB/sec memory bandwidth. The W7000 and W8000 both offer 4GB of GDDR5, with 1,280 and 1,792 stream processors, as well as 154 and 176GB/sec memory bandwidth respectively. All W-Series cards feature high-speed PCI Express 3.0 for the fastest data transfer currently available in pro graphics. The top-end W9000 has a whopping 6GB of GDDR5 and 264GB/sec bandwidth, plus 2,048 stream processors. Compare these to the previous high-end FirePro V7900's 1,280 stream processors and it's clear that the W-Series is a significant advancement in this area.

AMD's latest W-Series FirePro graphics cards bring an unparalleled level of performance to CINEMA 4D, yet they are still very reasonably priced

TAKE IT TO THE NEXT LEVEL

The twin Xeon E5-2687W processors in the Dell Precision T7600 have plenty to offer modelling, with Turbo Boost in particular squeezing every last drop of performance available when not all the cores are in use, as is usually the case when navigating a modelling viewport in real-time. Turbo Boost also enables a single Xeon core to hit 3.8GHz when required; however, these eight-core CPUs come into their own when your workflow turns to the final rendering stage. Intel's Hyper-Threading Technology means that each physical core can be split into two virtual ones, so the two eight-core processors present a grand total of 32 virtual cores. This means the T7600 can render as fast as any dual-socket workstation currently on the market. It's like a render farm in a single box.

Whether you use CINEMA 4D's excellent built-in Physical Render Engine, or one of the many third-party renderers the application supports, the T7600's gang of processors will race through a render, even when highly intensive features like Global Illumination have been enabled. CINEMA 4D's own renderer takes full use of all 32 virtual cores, so can benefit from everything the T7600 has to offer. The generous 4GB of memory on the AMD FirePro W8000 and huge 128GB of DDR3 system memory mean this workstation can handle huge textures with ease as well. So you won't need to hold back on your creativity for fear of taking too long at the output stage.

Although CINEMA 4D supports network rendering, with up to 64 processing threads on each node, the Dell Precision T7600's huge rendering power means that you can create production output extremely quickly on the same system you use for modelling. The system is around three-times faster at rendering compared to a quad-core Intel Core i7-2600K, which is no slouch in itself.

WHY A DELL?

The Dell Precision T7600 packs a mighty punch. Just feast your eyes on these specs:

- 2 x 3.1GHz Intel Xeon E5-2687W
- 128GB 1,600MHz DDR3 SDRAM
- 4GB AMD FirePro W8000
- 2 x 256GB Lite-On LCT-256 solid-state disks
- PLDS DS-8A8SH DVD rewriter
- Windows 7 Professional 64-bit
- Three-year warranty

The twin Intel Xeon processors in the T7600 provide huge rendering potential, just like a one-box render farm, with performance to match multiple single-socket workstations

FREE CINEMA 4D WEBINAR

See CINEMA 4D in action on the Dell Precision T7600 with a FirePro W7000

To find out more about how the AMD FirePro and Dell Precision workstation perform with CINEMA 4D, check out the free webinar at **www.fireprographics.com/cinema4d**. Hosted by Liam Stacy, the managing director of MAXON UK, he also demonstrates how you can compare the performance of your workstation using MAXON's free CINEBENCH testing tool.

The Dell Precision T7600 sports the best components currently available, making it the perfect platform for modelling and rendering with CINEMA 4D

ALL TOGETHER NOW!

The Dell Precision T7600 and AMD FirePro W8000 really are the ideal partners for CINEMA 4D R14. Whether you are at the modelling stage or rendering your animations as the final output, this heady combination will give you the speediest performance at every point in your workflow. The FirePro graphics keep your viewports fluid, even when you use the amazing new tools offered in R14. The software's support of Enhanced OpenGL, also accommodated by the FirePro, means the previews you can obtain will be realistic, with visible shadows in line with the final output. This means you can get a good idea of how your scenes will look before you hit the Render button, which can save a lot of wasted time.

When it's time to render, you won't be sitting around too long for your 3D graphics to export at a high resolution. The Dell Precision T7600's armoury of processing cores and lashings of system memory mean it can storm through renders as quickly as a number of single-socket workstations put together. If you want your 3D modelling and animation at its very best, you simply can't get much better than CINEMA 4D R14 running on a Dell Precision T7600 workstation, complemented by an AMD FirePro W8000 graphics card.

For more information about the Dell Precision T7600, the AMD FirePro W8000 and CINEMA 4D, head to **fireprographics.com/maxon**

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Cornelius Dämmrich

3DArtistonline

Username: Eimer

Website www.zomax.net

Country Germany

Software used CINEMA 4D, ZBrush, V-Ray, Photoshop

Software used in this piece

CINEMA 4D · V-Ray · Photoshop · ZBrush

> ZBrush-sculpted objects were incredibly detailed. After exporting them to CINEMA 4D they needed some enhancements. A fresnel shader is one way to deal with this – ambient occlusion is another

00:10AM 2012

This image was part of the CGChallenge XXVII: TEN at www.cgsociety.org. I was inspired by the online magazine, *Bulletin of the Atomic Scientists*, which invented an imaginary doomsday clock that conveys how close humanity is to catastrophic destruction – the figurative midnight. Every year they set it to something before midnight to illustrate how close the nuclear threat is. I thought it would be fun to play with this concept in a tragic and humorous way and set this doomsday clock to a time after midnight – in this case, ten minutes. In my image time is over and the clock stands still.

> To create the debris on the floor I used a plug-in called 'Paint on Surface' for CINEMA 4D. Use reference material if you want to know how real-world stones behave in environments

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3DArtist

Masterclass

Mohammad Modarres teaches the art of achieving dynamic and authentic models using traditionally inspired techniques in ZBrush

The final model rendered in Maya with V-Ray

Dynamic anatomy

> Here we'll focus on creating a posed figure in ZBrush from a standard Mannequin

When building any figurative sculpture – be it a digital or a traditional one – there are a lot of questions and challenges that we face. In art, there are certain aspects that remain just as important across all disciplines. This includes the principals of figurative sculpting.

This tutorial showcases my current workflow for creating dynamic figure sculptures in ZBrush. This isn't the only way to achieve the end result, but it's a method that works best for me right now.

The goal with this project is to use some basic art principals, alongside anatomy references, to create an anatomically correct figure with digital clay. There are many ways to start modelling in ZBrush. While it essentially comes down to personal preference, or which pipeline is dictating the process, there are a few ways that artists will tend to start their models.

Beginning from a previously made base mesh or model, then sculpting a new variation of it, is not uncommon. Many artists and companies work this way, as it's a great method to save time during the production process. Also, there's less need to study forms and anatomy since the model starts with established proportions and basic forms. I always use this method for production work – especially when deadlines are tighter.

Alternatively you can start from scratch with the new ZBrush features, like DynaMesh and the Mannequin. This way you can build the forms just as a real sculptor would. This is by far my favourite way of modelling – especially for toys and posed models. While it takes more time to complete, the result is always more unique than using previously made models. This way I can also keep a close track of my own progression as I sculpt.

As I like to turn off Symmetry for my personal models to push their natural feel, this latter method is the closest you can get to achieving an authentic effect. It may be prolonged, but the results are impressive.

The following tutorial will describe the latter approach, with a few additions from my personal workflow thrown in. I will be using Symmetry at first to save some time and to keep things briefer, but I'll turn it off later in the project to add more asymmetrical shapes to the model and increase the sculpt's believability.

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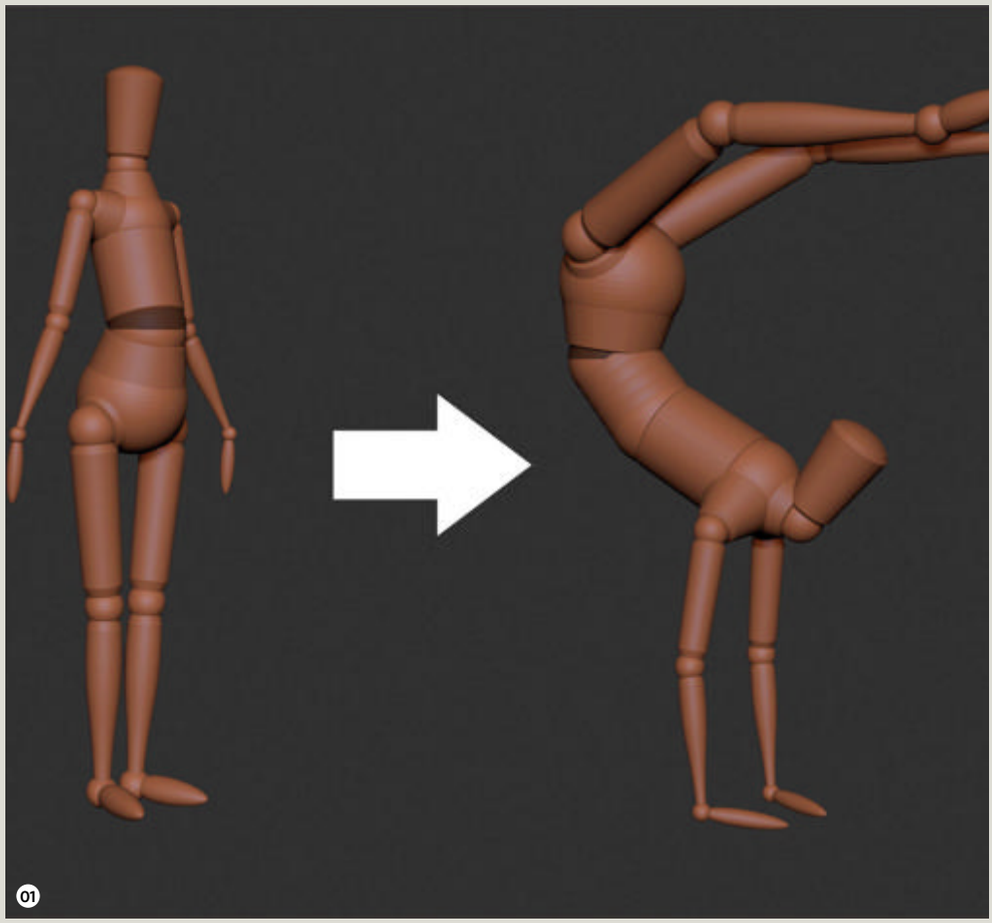

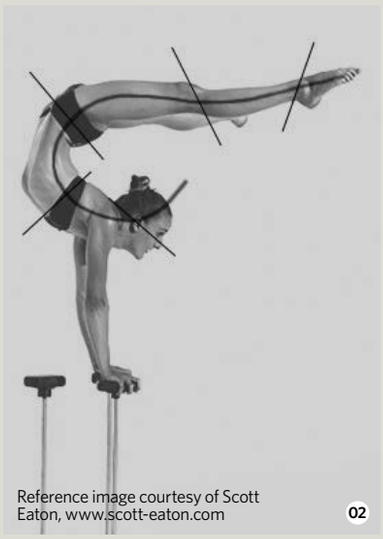

Reference image courtesy of Scott Eaton, www.scott-eaton.com

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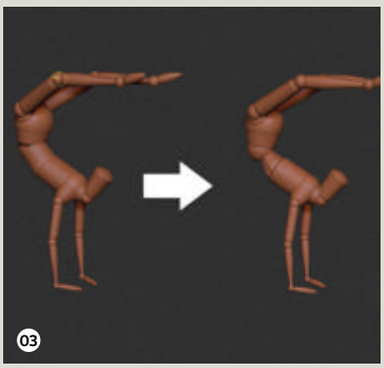


03

Know your brushes

Like the tools used in traditional sculpting, brushes in ZBrush have a lot of functionality to create forms. Here are some of the main brushes I'll be working with on this project:

- Basic Standard
- DamStandard
- Move
- Move Topological
- Clay Buildup
- Pinch
- Polish
- hPolish
- Trim Dynamic

To speed up my workflow I assign a shortcut to each of these brushes, each between 0 and 9, plus some other variations with other keys. I usually work with default settings, but for the Pinch tool I change the Brush Modifier to 90 for better control. This is useful for creating fingernails and to add some mid-tone values to the sculpt.

01 A dynamic pose can get your model noticed

02 Add some gesture and give an S shape to show rhythm

03 The transition from the Mannequin to the Polymesh model

04 Shape the basic forms at this early stage of sculpting

Anatomy sculpting workflow

01 Define the initial pose

In ZBrush, hit the comma (,) key on your keyboard, or go to Lightbox>Tool. In the Project>Mannequin subfolder select the 8headfemale by Ryan Kingslien and then use the Rotate function to pose the Mannequin. It's important to note here that the Mannequin will serve as our basic armature, just like in traditional sculpture. You shouldn't feel limited by its proportions, so try to see it more as a guide.

02 Use references

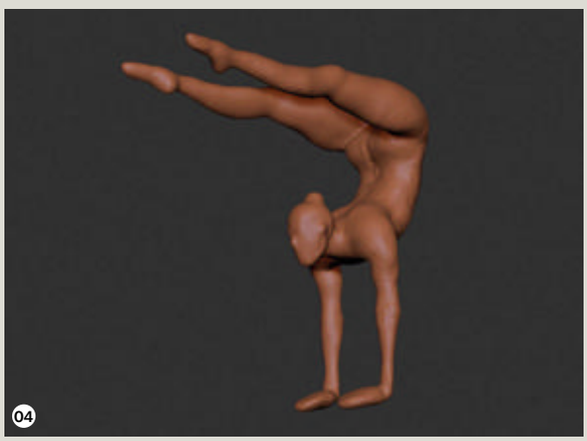
One of the most important aspects of sculpting anatomy, which I feel often gets neglected, is the movement of the pelvis and its relation to the chest. This should always be noted and defined correctly earlier on in the process. One of the interesting things about digital sculpting is that you can alter the gesture and proportions at any time. Of course, with traditional media this isn't so easy. All reference images in this tutorial are used with permission, courtesy of Scott Eaton and his incredible Bodies in Motion reference gallery. Visit www.scott-eaton.com/category/bodies-in-motion.

03 Convert the Mannequin

We now need to get our Mannequin into the correct mode for further work, so we can now convert it to Polymesh. After posing the Mannequin in the desired position, following the reference image being used, hit the Make Adaptive Skin button and insert the new tool below the posed Mannequin.

04 Establish basic forms

At this stage we can start adding the primary forms using a combination of the Inflat and Clay Buildup brushes. For marking the lines on the forms, use a modified Standard tool or alternatively the DamStandard brush. The main thing to concentrate on is building the box shape of the pelvis, along with the overall egg form of the chest. Next we need to identify all of the bony landmarks. For this



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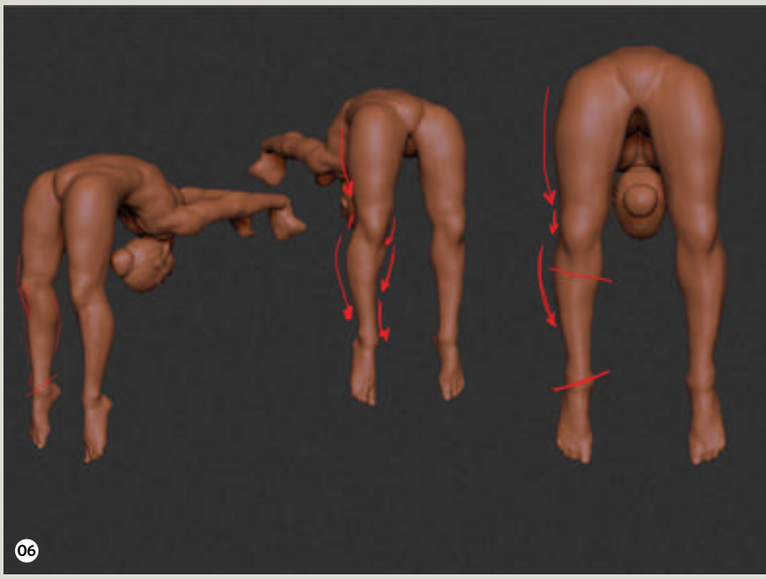


Top anatomy books

There are many anatomy books written by some of the most talented and inspirational artists out there. While a lot of them are great to have in your library, I have a few favourites that I use *constantly* in my work:

- *Atlas of Human Anatomy for the Artist* by Stephen Rogers Peck
- *Artistic Anatomy* by Dr Paul Richer
- *Anatomy for the Artist* by Sarah Simblet
- All books by Andre Loomis
- All books by George Bridgman

05 Add more detail to the overall form of the body

06 Pay attention to how the forms interact with one another and how they change in different positions

07 Various stages of finishing the hand

step, we'll turn on the DynaMesh option under Tool>Geometry and start with 256 to 512 Resolution.

05 Refine your forms

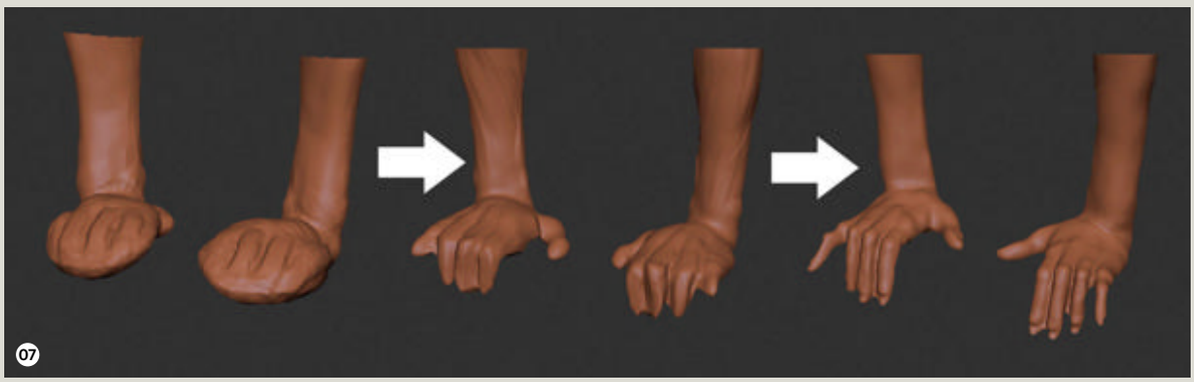
Continue to push the rhythm of the character, working on the proportions and forms to take it to the next level. The way I work on anatomy sculpts is generally more gestural to some other artists. I tend to lay down forms here and there rather than making all the basic forms first and then refining them later. It's highly recommended to get your basic shapes first, though, before refining. I find using George Bridgman's basic masses helps a lot to establish forms quickly. You can then apply more secondary forms on top. Scott Eaton has a PDF version of George Bridgman's 1920 classic *Constructive Anatomy* on his website, which is a fantastic resource for 3D artists: http://tinyurl.com/GeorgeBridgman.

06 Correct the shapes

We need to take a look at every individual component of the body – particularly the lower body with this pose – and compare it closely with the reference. As I work, I'm constantly making changes and correcting mistakes by looking at anatomy books to help me understand how the body moves.

07 Form hands & feet

After establishing the main forms, we'll start adding basic gesture to the fingers using the Move, ShakeHook and Inflat brushes. These tools are really handy for adding volume to fingers. The most important thing at this stage is to concentrate on the gesture of the fingers and toes, rather than focusing of any other details. When the rhythm of the fingers and toes is correct, we can begin to add more detail. One of the best methods to help create believable fingers and toes is to pay close attention to the bones of the hands and feet. Be sure to keep using references to get these right.



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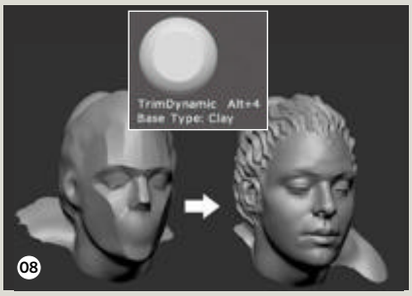
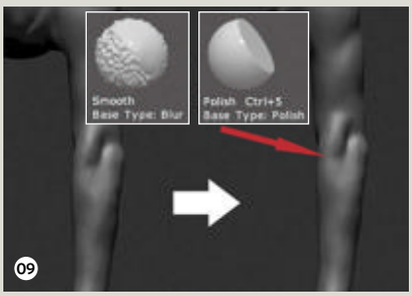
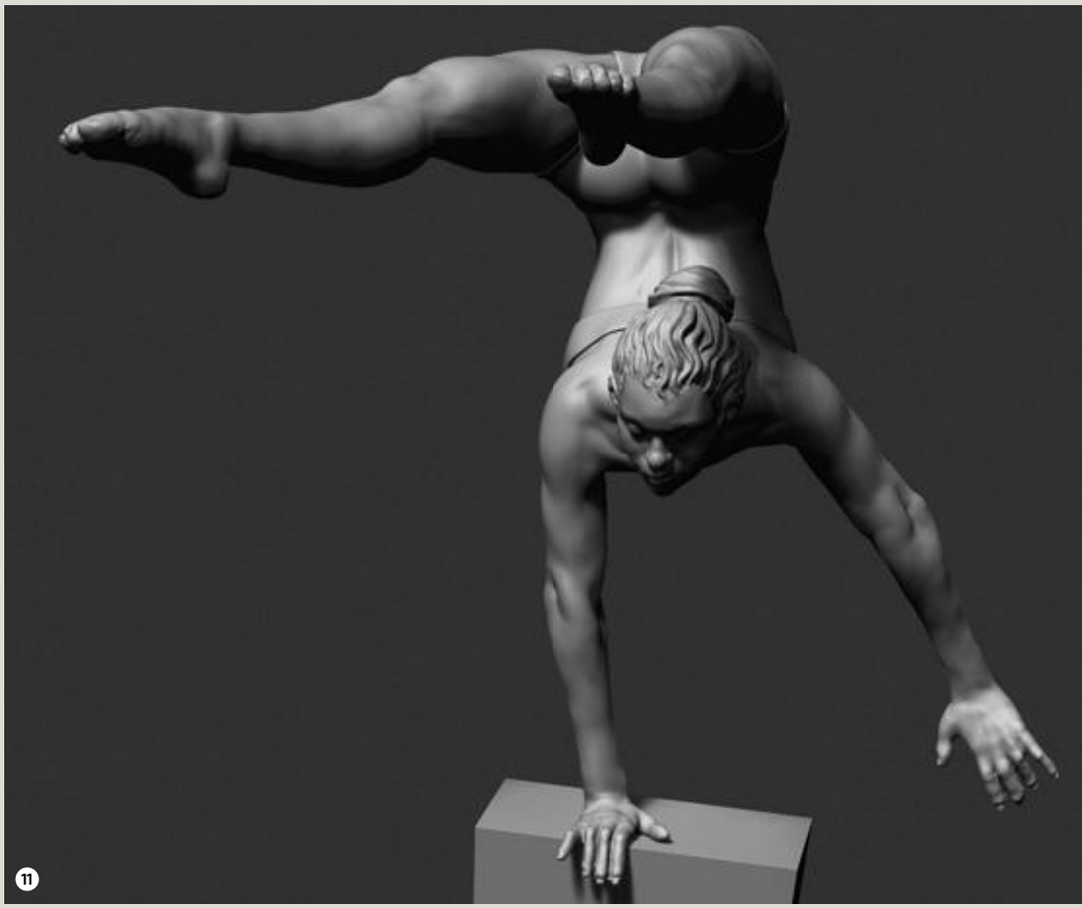






08 Showing the forming of the head, from basic planes to the added detail

09 Using the Smooth and Polish brushes to remove any lumpiness left on the model

10 For the hair we'll use some S and C curves, as well as the Spiral option

11 Choosing the right pose of your character is vital to achieve realism

Lighting & materials

One of the most important elements for creating a sculpture – whether in digital or traditional – is light. Without light, we can't see the planes of the model, so creating the forms becomes harder and sometimes impossible. While there are a lot of different materials and MatCaps in ZBrush, I believe the best one for sculpting is the Basic Material. This shows the light in real-time. I prefer to modify the Basic Material and add more Specular highlights to it. This new material also has better control over my highlights, which is extremely important to achieve the best results. I constantly change my materials when working to see how different lighting affects my models. This will help you find any defects in your models. Traditional sculptors will also use lights to hunt down imperfections and we can do the same trick in ZBrush.

08 Work on the head

To start on the modelling of the head, we'll add more volume to it while thinking about the simplest forms first. Though the basic shape of a head is fairly oval, a block or a box actually represents it in a better way, since we can see at least the basic planes and divide to even smaller ones. It's vital that you locate some excellent references to help you develop the head. I can highly recommend all of George Bridgman's books as well as the re-released *Figure Drawing for All It's Worth* by Andrew Loomis. Using Trim Dynamic will help the plane become easier to work with. When all the basic planes are established, we can start to add secondary forms. Take note that we've changed the material at this stage.

09 Refine the details

After adding all the details, we can switch to the modified Basic Material with more Specular highlights. We need to take a closer look at every part of model to find any lumpiness and then clean it with the Smooth or Polish brushes. Using different lights at stage is a must. The DynaMesh mesh will usually contain some little artefacts due the nature of it. In this case we'll duplicate the model and apply the QRemesher option to create a new, clean mesh. We can then project this new mesh onto the DynaMesh mesh.

10 Sculpt the hair

The most important thing to remember when sculpting hair is to think in terms of large masses, rather than of each individual strand. We must also consider the attachment of the hair to the skull, which takes place in three masses: around the frontal bone, the temporal bone and below the temporal region. I also find using S and C curve movement gives the hair more dynamism and believability. For the hair of this model, we can start to design the flow and main mass with the Clay Buildup brush. Next we'll use the Standard brush with Alpha #38 or #39 and then give the hair more flow and dynamism with some touches of the Spiral brush.

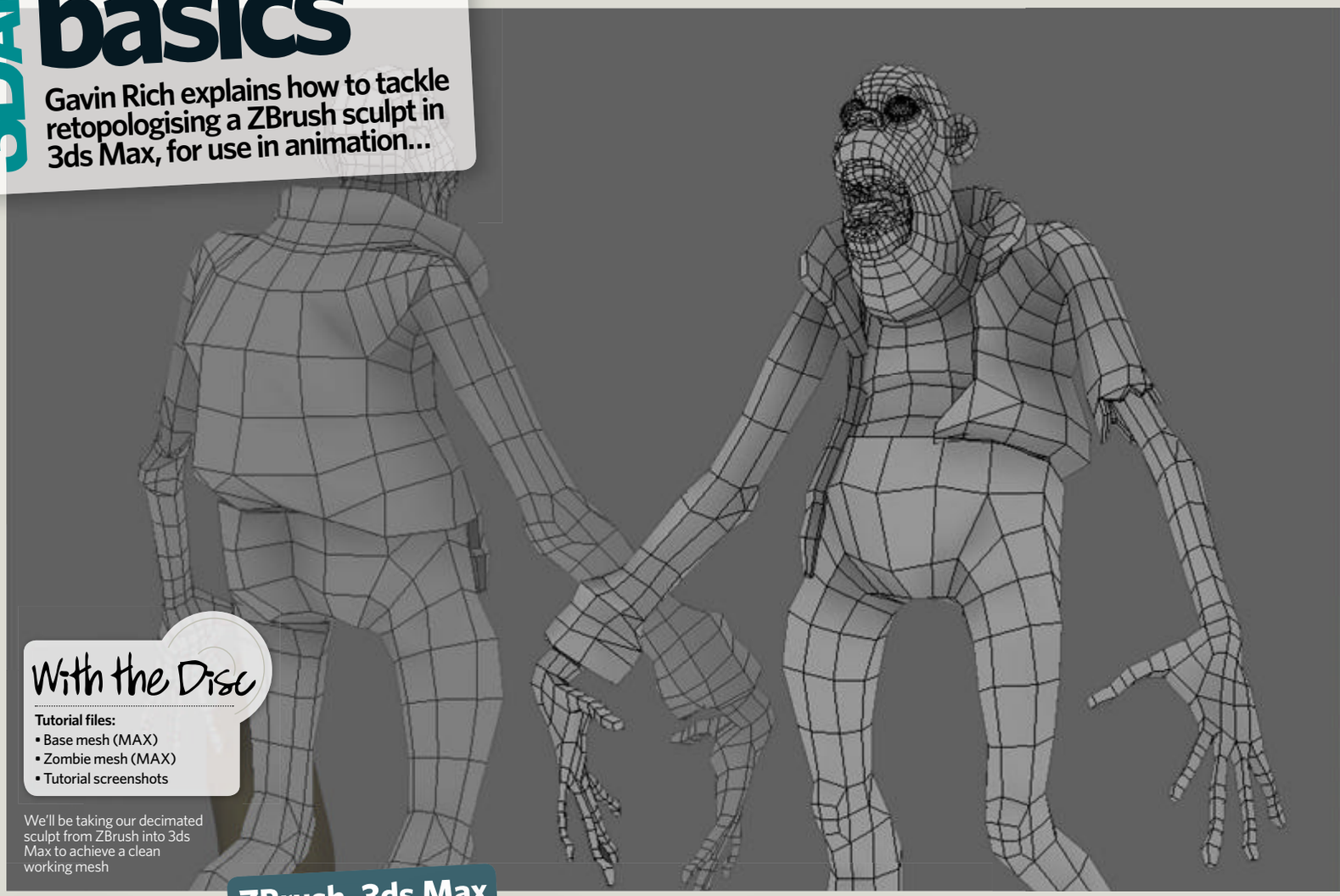
11 Pose the character

For works of a more dynamic nature, I usually start with a posed model without Symmetry activated. However, for this project I started from a symmetrical model and only turned Symmetry off after adding all the forms. The key thing here is to find the centre of mass. Try to visualise how the body will stay in balance and adjust your work accordingly.

3DArtist

Back to basics

Gavin Rich explains how to tackle retopologising a ZBrush sculpt in 3ds Max, for use in animation...



With the Disc

Tutorial files:
- Base mesh (MAX)
- Zombie mesh (MAX)
- Tutorial screenshots

We'll be taking our decimated sculpt from ZBrush into 3ds Max to achieve a clean working mesh

ZBrush, 3ds Max

Clean up 3D models

"ZBrush sculpts are beautiful and fun, but now we need to turn that mesh into something an animator can work with"

In a clean and optimised mesh, polygons should serve one of three functions: to hold the form for lighting and a silhouette; to properly deform for animation; and to support the textures (though this is more of a concern in low-res game meshes).

The character featured in this tutorial will be made with videogame specifications in mind, although cinematic meshes should follow a lot of the same rules.

I'll be taking you through my pipeline, which I have found to be very efficient and gets great results. Specifications are always changing in a videogame environment, so having a mesh with a flexible topology will save you hours of time. As someone who has often turned a cinematic mesh into a videogame-oriented one, I find being able to quickly increase or decrease its resolution is very important. As such I try to keep each vital section of my model very independent. This way, if I'm optimising an arm, for instance, I'm not having to worry about that loop taking an important line out of the leg or face.

Throughout this tutorial I will be explaining some of 3ds Max's tools and why I use them in certain scenarios versus others. For further explanations of each tool mentioned, 3ds Max's ToolTips system in the Graphite Modeling Tools panel is very thorough. Likewise, 3ds Max's Help documentation gives an in-depth look at each facet of the program, as well.

How to retopologise ZBrush models with 3ds Max

01 Check your settings

Before beginning work on the character, there are a few vital points that need to be covered. First of all, Symmetry is an essential feature, but turn off Slice Along Mirror as this can leave floating verts along the central line. Also get acquainted with the Graphite Modeling Tools section and use the high-res model as the live surface.

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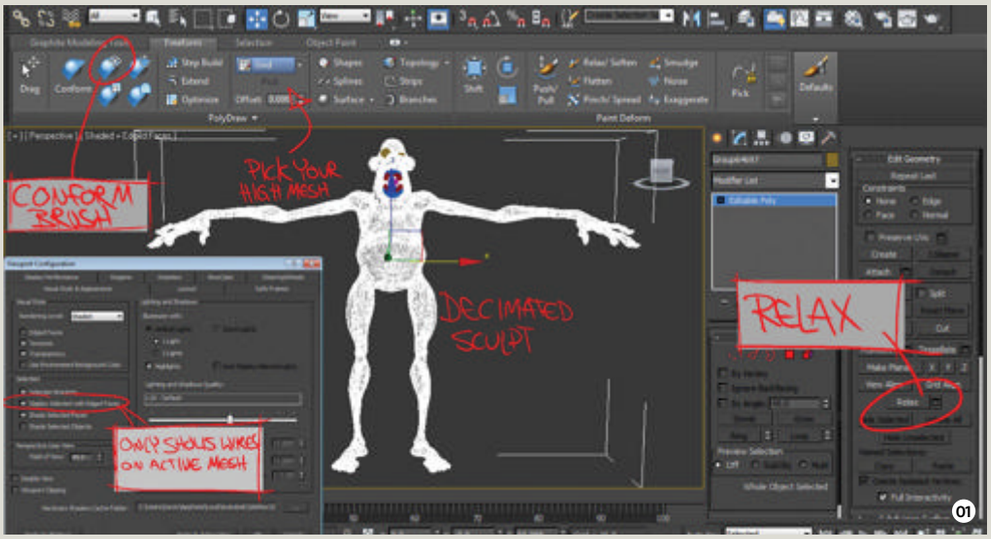
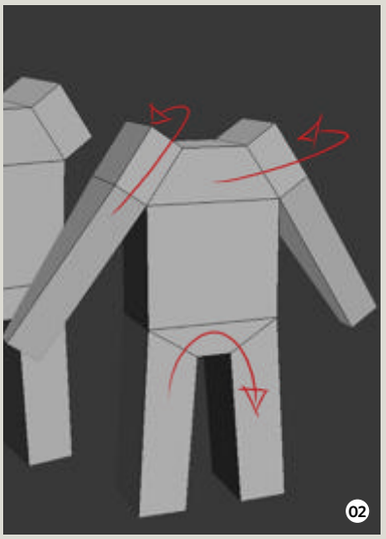
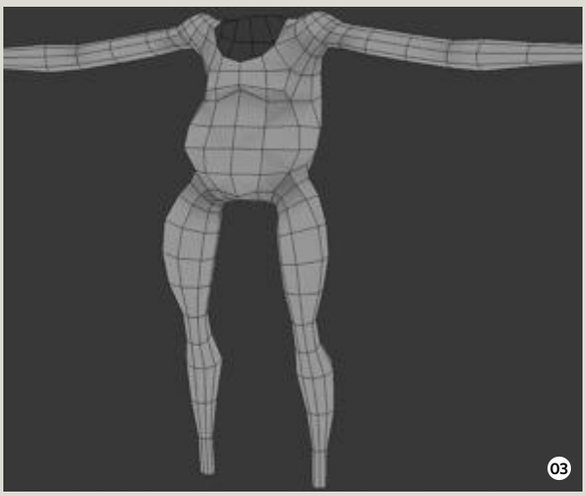






Activating the X-Ray display (Alt+X) on the high-poly model will let us see through it while modelling. This is a great way to make sure we're focused solely on the new mesh.

02 Make an initial block-in of the body

I always start a new mesh with a simple poly flow that can be achieved immediately in a few straightforward steps. This will save many headaches further down the line. Because of how the segments of the body fit together, we're able to increase and decrease the resolution of individual parts without having to worry about the loops getting too dense in another section. Animators that have worked with my meshes have all agreed that this is animation-friendly and my students find them easy to rig.

03 Refine the shape

Once the quick layout is done, I start using the Conform brushes in the Freeform tab. These act like the ZProject brush in ZBrush and vacuum-form my low-poly model to the high-res version. As I add more geometry I try to keep my topology even and straight. Whenever things start to get jagged or sloppy-looking I simply hit my mesh with the Relax option in the Edit Geometry rollout. This will indicate any areas that have warped too far. Elements of the mesh where polygons are too stretched or warped will need attention. As long as you haven't strayed from this topology so far, the SwiftLoop tool should never create a triangle or Ngon on this mesh.

04 Sketch out the face

The face is a difficult area to model, as there are lots of flow changes for the purposes of animation. If you follow the flow of wrinkles on an elderly person's face, you'll clearly see where the control lines should go. Make sure the flow of the muzzle goes all the way around the chin, as a lot of people bring it over the top of the chin by mistake. Look at the lines on someone's face when they give a big smile and notice how the line goes from above the nostril to behind the chin. This model should reflect that. 3ds Max has a tool called Viewport Canvas that enables you to paint directly on the model. I use this to sketch out my main flows before I start.

05 Block in the face

I start the face model with two rings of eight polys, plus a box. These will be my starting points for the mouth: one eye and the nose. I warp these shapes to my high-poly surface, using the Conform brushes again, so now my main areas of focus have their basic topology. By switching between the SwiftLoop tool and the Conform brush I'll add more definition to my shapes. I can also keep an eye on how my edges are lining up on each section of the face, so when the time comes they will connect easily.

06 Fill in the gaps

At this stage I'm more or less connecting the dots with the Extend and Step Build tools. These options make retopologising complex areas very easy. I pull out edges and fill the gaps with the Step Build tool, or

01 To begin, activate Symmetry, but uncheck Slice Along Mirror

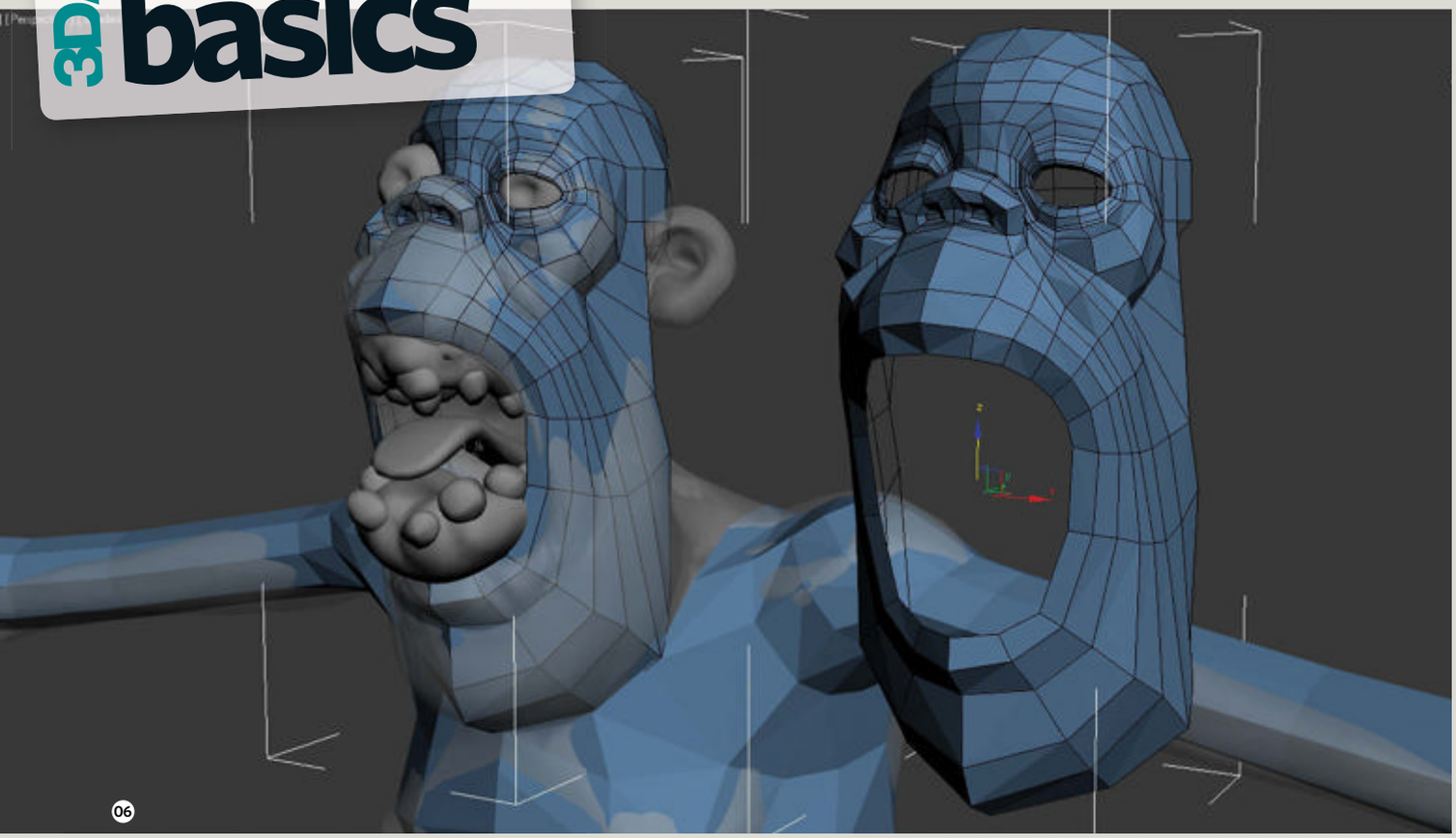
02 Laying the foundation of my zombie model

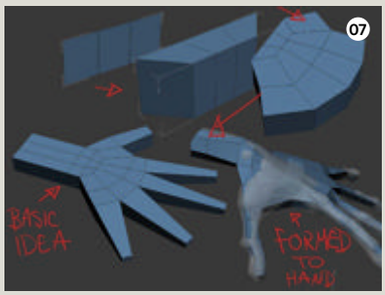
03 Using the Conform brushes

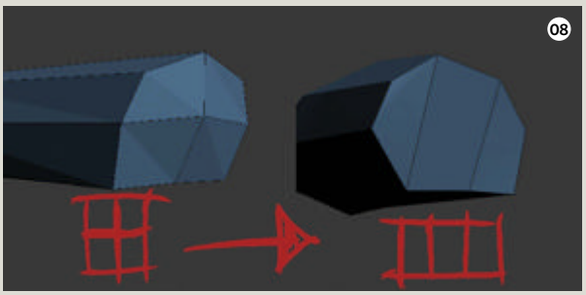
04 The Viewport Canvas in action

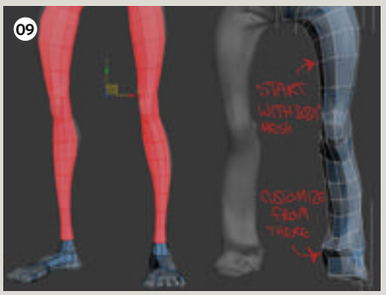
05 Always use broad strokes at this early stage

3DArtist Back to basics









06 Connecting the blocked-in masses with the various Freeform tools

07 Getting hands right is a tricky process to master

08 Notice the nesting that occurs with the wrist. The hand should always be a step down from the wrist

09 Using the body topology to ensure the usability of the trouser elements

lay down verts that get filled in with the Extend toolset. As I mentioned in the introduction, if you hover over a tool in the Graphite Modeling Tools panel, the ToolTip will drop down and give a very lengthy description of the tool. I use these options to continue the masses of the face and head, while keeping the topology of the sketch in mind.

07 Approach the hands

Hands are a fun problem to solve, as thumbs move in different ways and deform a lot of mass. I have never seen two artists approach hands the same way, and I handle them differently every time I model. All of the end caps on my model's limbs should still be at eight sides, currently. Eight edges can be 2 x 2 polygons but here I'll make them 3 x 1. This gives me three polygons to extrude fingers from – which isn't the average hand of a human, zombie or not.

08 Build up the hand

I need to extrude out the three polys and scale them down width-wise. There should be five polys in an arch, which will be the four fingers and the pad between the thumb and forefinger. I extrude this set out twice, with Local Normal turned on in my Extrusion settings. The thumb will come out of the side of the first extrusion and the fingers will come out of the tips of the second extrusion.

09 Clothing characters

The most important thing when two meshes overlap is that they share the same topology wherever they are close to each other. If they don't overlap vert-for-vert, the body mesh will penetrate through the clothing mesh when animating. Working on the body first is best, because all of the poly flow is laid out at this point. I start by grabbing the polygons that represent where

Choose when the time is right

How and when to use triangles in models is something people will argue about until the cows come home. I believe as long as you use them carefully and they don't disrupt the mesh for animating or lighting, go for it. Don't put any triangles in until you are finalising your mesh. If you are trying to increase or decrease the resolution of your model and there are triangles, they will disrupt your rings and loops. This will cause you to fight for good poly flow and force you to fix issues rather than just quickly and efficiently knock out a mesh. Triangles are very dangerous and often feel like the only option in certain scenarios, but do not fall into the habit of using them just because it's convenient. They should be used carefully to solidify forms and enhance parts for animation.

the trousers would be, then hold Shift and slightly move or scale them just enough to make a copy. Now I have a separate mesh I can begin defining it into a set of trousers.

10 Complicate the clothing

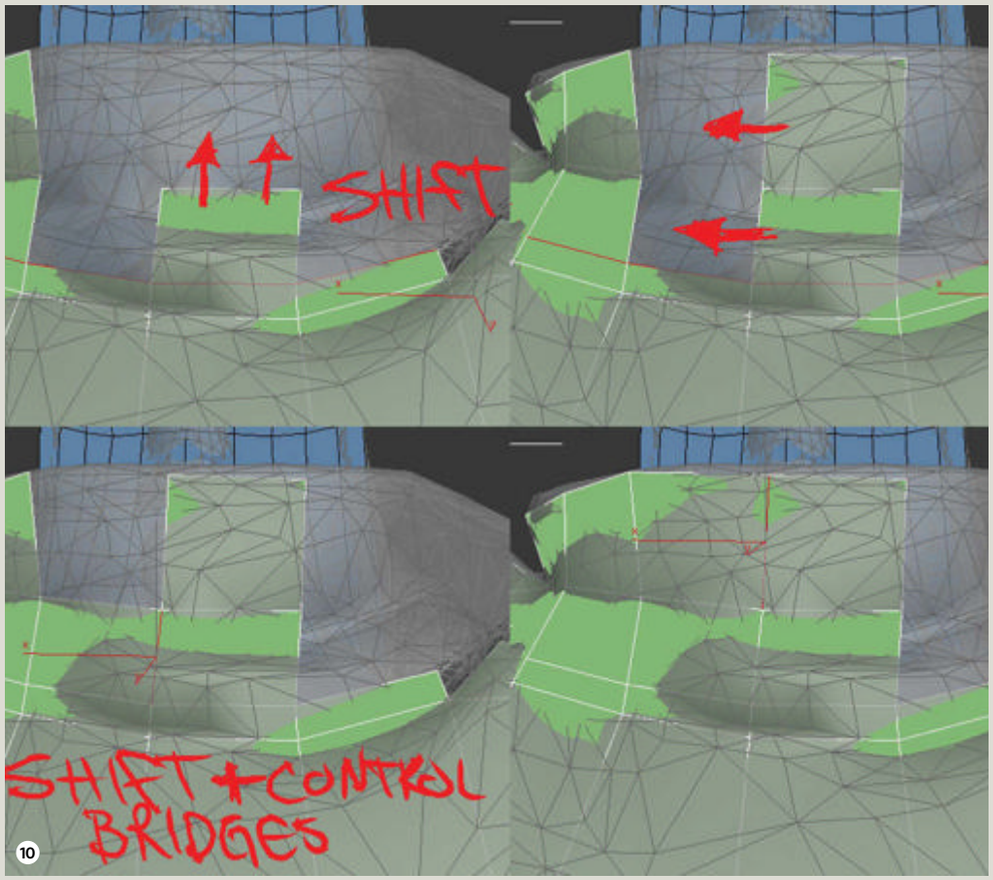
I've decided to give my zombie an open shirt. This will show overlapping meshes that share topology where they are close, but become different as they separate. To start this mesh I'll begin with the same steps used for the trousers. Now that I've made a skin-tight shirt for the model, I can open up the front and use the Step Build tool in Freeform to quickly sketch out the hanging shirt pieces. Depending on the type of project you're working on, clothing can be handled in a number of ways. Very low-res videogames may have one-sided polys. Some projects will need the sleeves to be capped, while others may need a Shell Modifier to thicken up the whole mesh. For this stylised project I will be modelling the backside to the shirt, but leaving anything hidden by the body open.

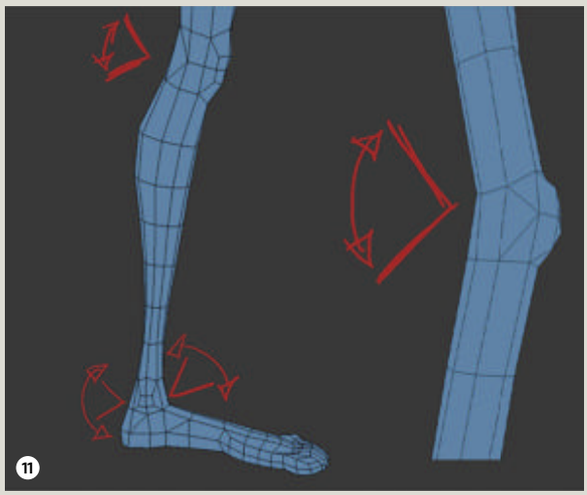
11 Add triangles & finalise

At this point the mesh is almost done, but I still want a few special edges for UV seams and around the joints. For the UV seams I like to put a line diagonally around the shoulder. This acts like the seam of a shirt when unwrapping. If an area has too many loops around it, I will often use triangles to pinch off a bit of poly flow by making a ring selection. I then deselect the area I want to keep and use the Collapse function to pinch two lines into one. After this is done I can approach the character's joints. For cinematic animation, there are more complicated rigging systems that will help these areas deform, but for videogames we have to be a bit more careful. I like using the trick of placing a triangle where a joint hinges. The point of the triangle should closely line up to where the bone will pivot from and the triangle should open up towards wherever the joint is collapsing.

12 Check deformation for free with Mixamo

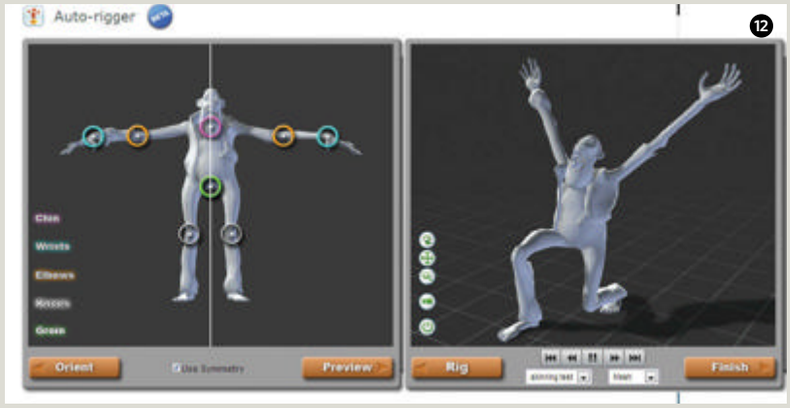
Mixamo (www.mixamo.com) offers an amazing service that enables you to upload your character and put a quick rig on it. The process is extremely fast and is completely free. I've adopted it as a quick way of testing my work before I pass it to the next person in the pipeline. On top of rigging your mesh, there are a number of animations you can apply to it and see what your character will look like when it moves. Mixamo is great for making prototypes to show your boss or clients, and it helpfully imports directly into most 3D packages.





Use ZProject to double-check

Before I unwrap my mesh I take my mesh into ZBrush and use the ZProject function to make sure it's perfectly lined up with my original sculpt. ZProject vacuum-forms one mesh to another and its settings can be found in your SubTool menu. Be careful: this option will project any visible information to the selected SubTool. With this technique you're able to transfer sculpture data as well as texture information. Usually I will do this to completely replace my original sculpt mesh. This results in my lowest subdivision in ZBrush being my retopologised mesh.



10 Adding more complexity to the clothing elements

11 Triangles in certain locations make rigging much easier and even help deform the model

12 Mixamo is great for testing out your prototypes

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The advisors

LightWave 11.5
Craig A. Clark
www.scorpiocgi.co.uk

Craig is a hard-surface modeller with over ten years of industry experience in films, TV, music videos and games. His portfolio sports a fantastic array of shiny objects

modo 601
Richard Yot
www.itchy-animation.co.uk

Richard is a London-based illustrator specialising in quirky characters. He enjoys giving his work dollops of hand-made charm to bring his intriguing visions to life

ESTIMATED TIME TO COMPLETE THE TUTORIAL
30 MINS

With the Disc

Tutorial files:
- An archive containing the scene and models used in this article (ClothScene)
- Tutorial screenshots

LightWave 11.5

Soft-body dynamics

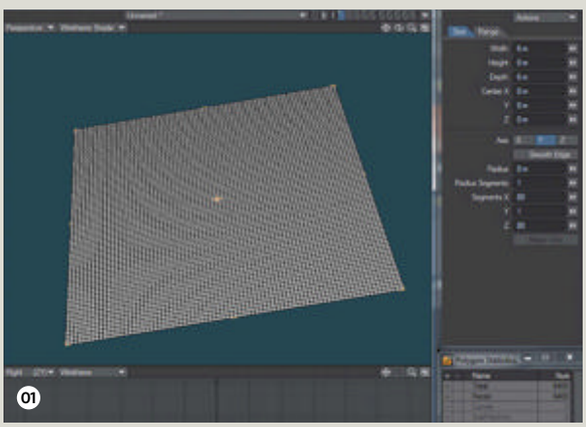
"How do artists convincingly drape fabrics in their scenes?"

Dynamics and physics are always popular topics for 3D software. Aside from any end-goal for the work you are doing, they're also something that can be fun just for fun's sake.

Traditionally, LightWave was never a really strong contender for simulating physics. This meant artists using the program had to rely on third-party plug-ins, if any solution was available at all. Later releases of LightWave did see some useful integration of physics, but the results weren't great and the workflow wasn't all that fantastic either.

LightWave 11 brought us Bullet Physics, the first incarnation of usable physics, and now 11.5 has made these even more accessible than ever. Previously you'd have to add a physics characteristic to geometry and include Effectors in the scene to implement the gravity. Now we have the much simpler process of selecting the object and specifying the basic nature of its physics.

Will it be a moving item that's rigid, deforming, or in parts? Is it simply a collision object that moves, or is it static? All of these aspects can now be specified. Simply hit Play on the timeline and the



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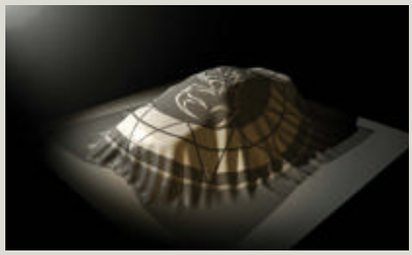

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physics will calculate frame by frame. You can also just make the current frame the last frame of the scene and let the whole scene be calculated first.

There's also the option to head to the Item Properties in the FX Tools and tweak the settings that govern the Bounciness, Rigidity and Friction attributes, among others. Depending on the physics being simulated, the effects of these parameters will be noticeable.

To get used to this process, try taking a screengrab of the Settings tab for your objects each time you make changes, so you have a record of what's been changed. There is nothing worse than finding you've forgotten which specific change you made in order to achieve a great effect.

Here we'll tackle a quick trick that should take you just 30 minutes. I personally find the process of simulating physics to be great fun – so enjoy it!

01 Create the cloth

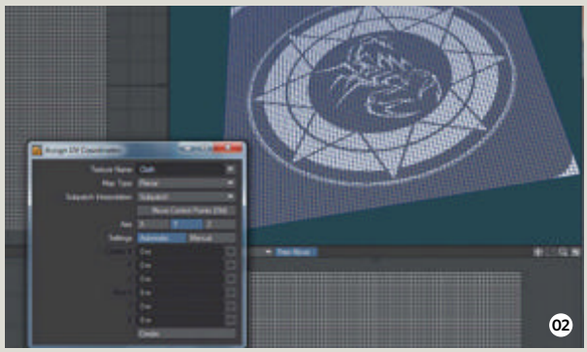
First add a piece of cloth and a ground object. The cloth is nothing more than a simple plane with a healthy number of segments in the X and Z axes. Make enough to give reasonable deforming definition, but remember it can be made a SubD object later to smooth its looks. The ground is a simple box with a slightly larger footprint than the piece of cloth.

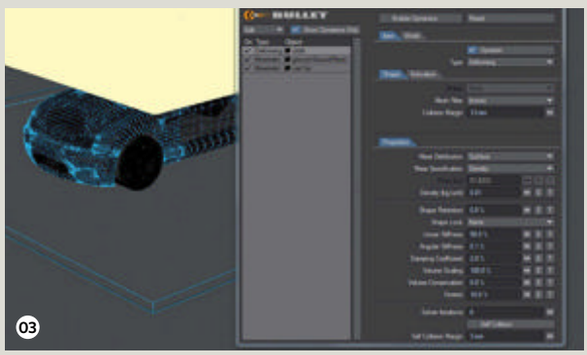
02 Make the UV map

To make things less dull, we'll stick a texture map on the cloth. A basic Planar UV map in the Y axis is sufficient to give us a texture that will deform nicely on the cloth, as well as make things look just a little bit cooler. Mapping UVs just ensures that no matter what we do, the map will be firmly stuck.

03 Set the scene

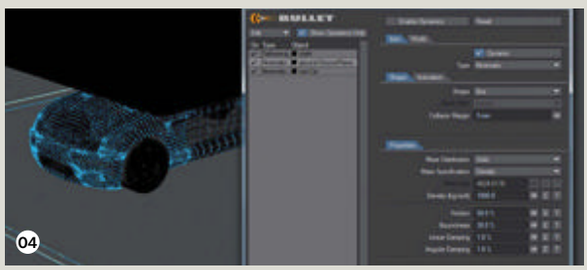
Now we've loaded in the ground and the cloth, we can add in the car model. Position the cloth a little above the car and set it as a Dynamic Deforming body. In other words, this means it will move by virtue of physics and will change shape when coming into contact with another body. Refer to the screenshot to see the settings, but these can be altered to change the car's behaviour.

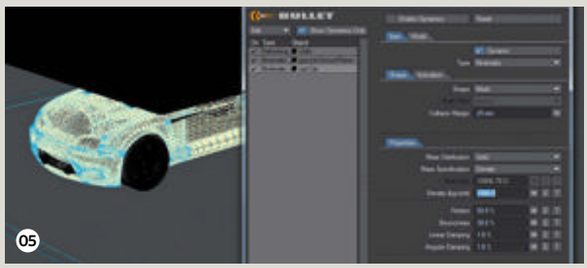




04 Apply physical ground

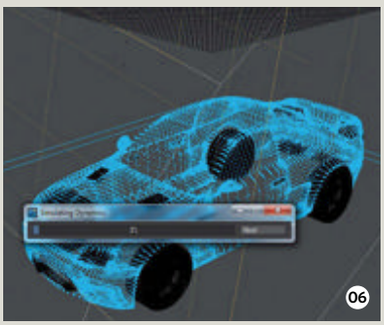
Now set the ground as a Dynamic Kinetic body. This means it won't deform and won't move on its own governed physics, unless animated to do so. The ground will generally not move all that much, so this is a good setup to use and does enable you to move it, if required, without changing all the settings. The Shape option has been set to Box to match the ground.





05 Edit the car's properties

Like the ground, the car is set as a Dynamic Kinetic body. We won't be moving it, but it could be animated if needed. Here the Shape option has been set to Mesh. None of the primitive collision shapes would work with a complex shape like a car. For this the physics are required to be calculated on the model shape, which slows the calculations down, but is necessary.



06 Begin simulating

Aside from beautifying the scene, we're ready to roll. Making sure the Dynamics system is enabled, just skip your timeline's keyframe slider to the end frame of the scene. A progress bar should pop up as the physics are calculated for the whole frame's range, so just sit back and wait for it to finish. You can scrub forward in the timeline manually and the calculations will be made for the frames you cover. How easy this process is will entirely depend on how monstrous your workstation is.

Patience is a virtue

Bullet Physics in LightWave 11.5 is great fun because it is – in its most basic form – very quick and easy to get results from. If you have a very specific goal in mind, though, tweaking all the settings can be a more laborious process. Depending on the complexity of the models, as well as the horsepower of your hardware, endlessly waiting for calculations can get very old, very quickly. It's worth taking a little time to make good and representative proxy stand-ins where possible. These will greatly speed up calculation times while making small adjustments or experimenting.

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- Tutorial screenshots

modo

Design a creature in modo

"How can modo be used for designing and concepting a character? Is it a suitable package for quick visualisation work?"

When it comes to creating quick-turnaround concept images for design purposes, modo is a very good solution. It's even used by Industrial Light and Magic for this very task. The workflow in modo enables fast modelling, lighting and rendering, which is why it's becoming well established as a visualisation tool.

The program's excellent modelling toolset, combined with a very powerful integrated renderer and one of the best real-time preview engines on the market, makes modo perfect for visualisation jobs. These features mean that an artist can create work very quickly, from model to final render, all in one place. With the built-in painting and sculpting tools concept work can also be carried out from start to finish within modo itself.

In this project we'll explore the creation of a creature character. We'll start with some very basic subdivision modelling, then Vector Displacement sculpting. We'll use the Geometry to Brush feature to create a spike to be applied anywhere on the mesh as a sculpted detail. modo's painting tools will then be used to paint the texture maps and finally the scene will be lit using softbox assemblies. These come as part of modo's standard content.

modo offers several flavours of sculpting. Geometric sculpting can be used as a regular modelling operation, as it affects the geometry directly. Sculpting with Multiresolution is suitable for high-detail geometric sculpting with multiple levels of detail. Additionally there are two types of image-based sculpting: one uses standard greyscale Height maps and the other Vector Displacement maps. Each approach is suited for different purposes, so the type of sculpting you decide on should depend on what you are trying to achieve.

In this case I'm opting for Vector Displacement sculpting, because it offers two important advantages: first the

sculpting doesn't depend on topology, so you can create any amount of detail without needing to consider the underlying topology of the mesh; second, this method enables you to apply complete 3D shapes as a brush. For instance, you could easily use this technique to apply fully formed ears to a head.

The program's interface is split into various tabs, each of which enables a very focused workflow dedicated to the task at hand. This means you can work in an efficient manner at each phase of the process, without being distracted with unnecessary interface clutter.

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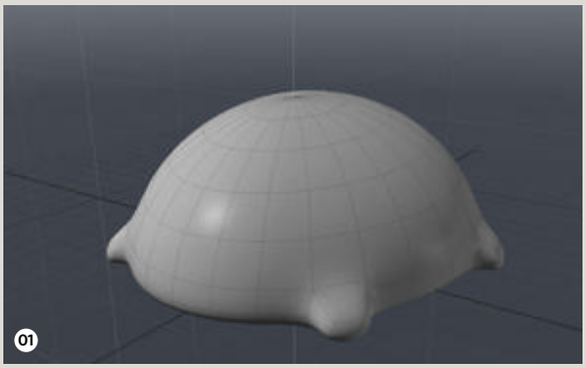
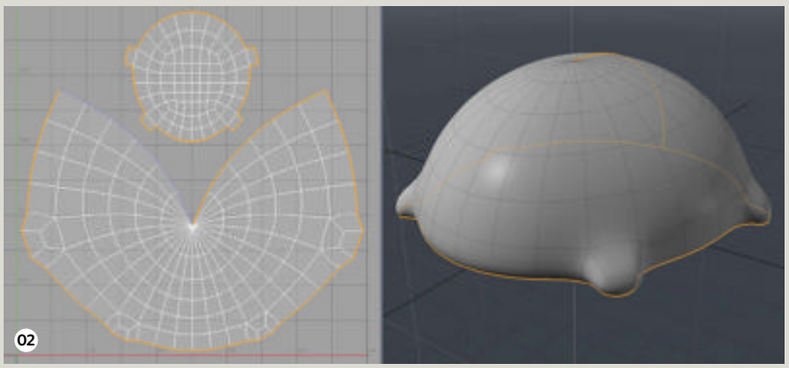


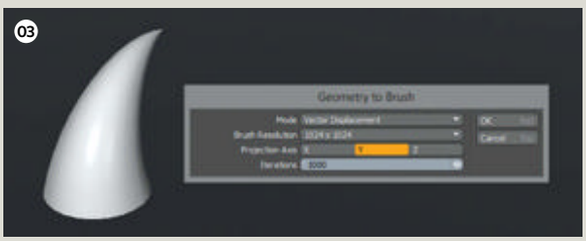


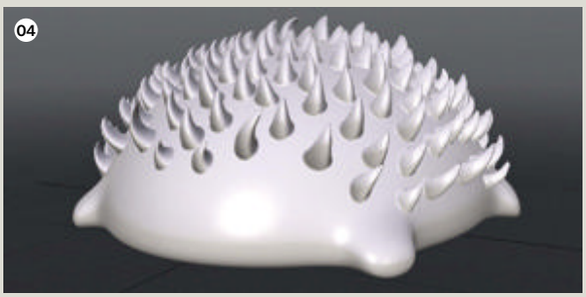
01 Create the basic mesh

Start with a simple sphere to create the basic mesh, then delete the bottom half and cap the open end with a polygon. Next, bevel this in a couple of times to leave a large Ngon on the underside of the mesh. Now turn on X Symmetry and bevel out some small limbs. The topology isn't important because the Vector Displacements aren't affected by it, so you can keep the modelling very simple.

02 Unwrap UVs

For Vector Displacement sculpting and painting the textures, the mesh is going to need to be UV-unwrapped. The seams should be in places that aren't going to be visible, because they can cause problems with the Vector Displacements. Select a loop of edges on the underside of the model and then a line coming halfway up the back. Now define the seams with the Unwrap command and use the Relax command to even out the UVs.





03 Make a spiky brush

Create a spike by drawing out a simple cone and then use the Bend tool to give it a more horn-like shape. In the Paint tab go to the Utilities panel and select the Geometry To Brush command. Set the mode to Vector Displacement, the Axis to Y and save the image. You can now use the spike as a three-dimensional brush by applying it with the Emboss tool as an image brush.

04 Sculpt the character

Now you can use the sculpting tools to add the details to your character, so add the spikes to its back and any other fun details you like. Your resolution is controlled by the size of the Image map, so the larger you make your Vector Displacement map, the finer the detail you can add. Vector Displacements aren't limited to depth or topology, so you can pull any shape out.

05 Paint the texture

The next step is to paint the textures on the character. Create a new transparent PNG, switch to the Brushes panel, select a hard round brush, Ctrl/right-click to resize the brush and then paint the eyes. You can layer transparent images in the Shader Tree much like a Photoshop document, so it's best to use several PNGs, one for each type of detail. Use Symmetry to save some time.

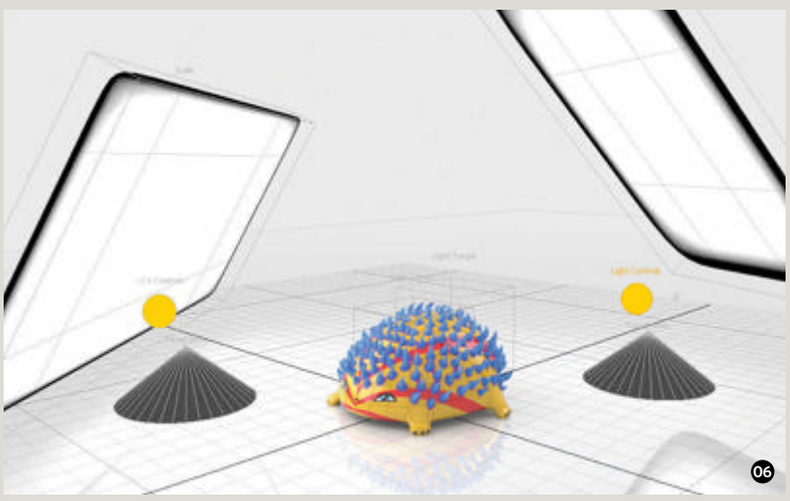
Working with RayGL & Preview

modo has a couple of methods for real-time raytracing that are perfectly suited to the processes of sculpting, painting textures and lighting. You can use the Preview window to see live updates from your camera view. Also, to keep the application responsive, you can turn off Displacements or the Global Illumination option.

Alternatively you can work in the viewport with RayGL, which also offers many levels of control in Preferences (such as disabling GI or reflections), and with the right combination of settings it can be tailored to be very responsive. This enables a decent texture-painting experience in a raytraced viewport.

06 Lighting & rendering

In the Shader Tree, set a white material in the Environment slot, turn on Global Illumination with Irradiance Caching, apply a reflective material to your character, and then add a couple of softboxes from the standard content (found under Assemblies). Position the softboxes to create some nice reflections on your glossy character and then you're ready for your final render. With large light sources like these, the default render settings will work well enough.



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Using textures provided by GameTextures, you can now easily create sci-fi space corridors in your game engine

GameTextures

With a growing library of production-quality textures, should you consider GameTextures for your next project?

REVIEW BY Roald Høyer-Hansen, freelance 3D artist, Norway

GameTextures is a subscription-based service that aims to provide busy artists and game developers with a variety of professional custom textures. Currently there are over 1,000 of these to choose from, with around 25 being added weekly. Plus, if you can't find what you're looking for, the site is open for all kinds of requests.

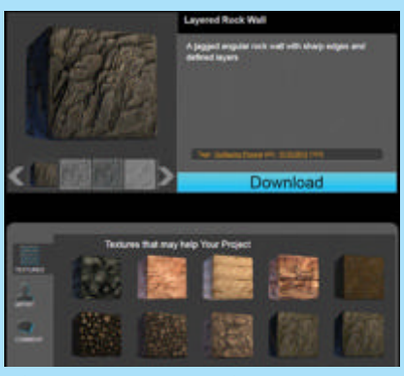
The texture library consists of everything from man-made architectural bits and pieces to more nature-oriented textures, such as stones, grass and a bunch of ground textures. Not only do you get an assortment of Diffuse textures, you also gain access to the corresponding Normal, Specular, Height, Emissive and Transparency maps, all neatly arranged in a zipped file.

To be able to download textures you have to sign up to one of the three available subscription options. At $14 US a month, the Hobbyist subscription is the cheapest and enables you to download 15 textures every day at a resolution of 1,024 x 1,024. Next up is the Freelancer deal at $19 US a month, giving you 50 daily downloads at 1,024 x 1,024. Lastly, with unlimited downloads and textures up to 2,048 x 2,048, the Corporate deal will cost you $299 US a month.

Browsing the GameTextures library works as expected, with a menu on the left-hand side displaying all the various categories and a preview window on the right. This window could be improved a little, as the preview images are quite small and there is no way to middle-click to open them up in new tabs. This means that you have to go back and forth quite a lot, which may become frustrating if time is of the essence, or if your internet connection isn't the best.

When you finally find the perfect textures, downloading them is a surprisingly slow process, with speeds barely reaching 270Kbps on a 100Mbit connection. This is most probably because the server is based in the United States, but hopefully the site's server park will be upgraded.

The quality of the textures, though, is excellent and you can clearly see a lot of work has been spent on every single pixel. And with new textures added weekly, GameTextures is well worth bookmarking.



When previewing textures, similar texture types are also suggested on the bottom of the page. Very handy!

*Price conversion correct at time of printing

Essential info

Price: $14-299 US per month / £9-£198* per month

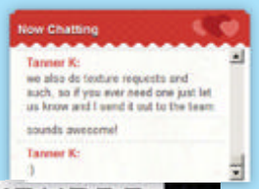
http://gametextures.com

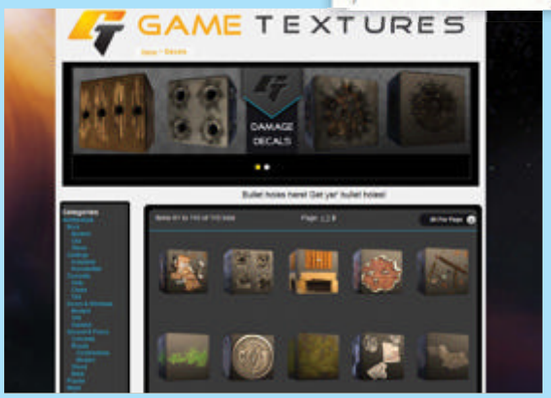
TECHNICAL SPECIFICATIONS

- All textures are supplied in TGA format

INSIDE EACH TEXTURE PACK YOU GET:

- Diffuse maps
- Transparency map
- Normal map
- Specular map
- Gloss map
- Height map


Now Chatting
Tanner K:
we also do texture requests and such, so if you ever need one just let us know and I send it out to the team
sounds awesome!
Tanner K:



The site navigation is the biggest drawback, as previews are small and loading times can be slow. The chat functionality is very useful though

The good & the bad

- ✓ Professional quality
- ✓ Tidy and organised
- ✓ Useful chat function
- ✓ Textures can be requested
- ✗ Slow download speeds
- ✗ Navigation can be a bit tedious at times
- ✗ Small texture previews

Our verdict

Features	8/10
Ease of use	8/10
Quality of product	10/10
Value for money	8/10

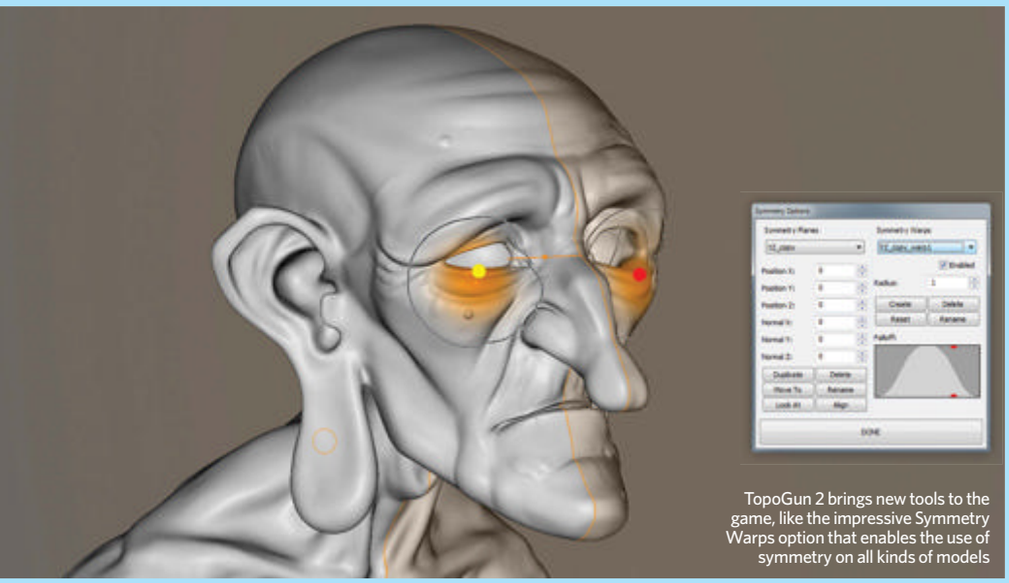
"With production-quality resources, GameTextures really delivers everywhere – except speed"

Final Score 8/10

TopoGun 2

In its second version TopoGun adds new and unique retopology tools that help speed things up

REVIEW BY José Alves da Silva, freelance character artist, Portugal



TopoGun 2 brings new tools to the game, like the impressive Symmetry Warps option that enables the use of symmetry on all kinds of models

TopoGun is a piece of software with one very important task in mind: retopology. This is the process of creating a new mesh on top of an existing model to make a version that's lighter and has an edge structure suitable for animation. Many people use 3D modelling software for this purpose, which can be very time-consuming.

TopoGun makes this task easier and much quicker, with an optimised and clean interface. You can simply import a high-resolution model and create new geometry by selecting its surface. New geometry sticks to the reference surface even as you move it around, while clever shading enables you to see the new geometry on top of the reference without it ever being occluded. Other small optimisations, like switching between Edit and Create modes, also speed up your workflow.

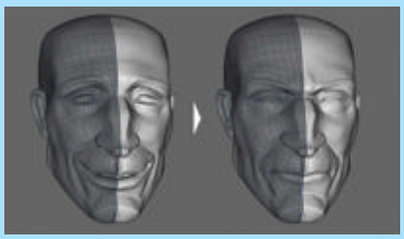
You can use the Draw tool to add lines to the surfaces, which generate new polygons when they cross. Sweep will create a single line along a tubular shape and automatically retopologise it, while the Tubes tool enables you to draw cross-section lines – TopoGun will connect them all. The Extrude tool also allows you to pull edges and create new polygons that crawl on the surface.

With the Brush tool you can paint selections, relax and move groups of vertices or move these along their normals to inflate the surface. This is important when compensating for any loss of volume as a result of retopology. Subdivision surfaces can be generated with or without projection and then exported for use elsewhere.

Symmetry in TopoGun is particularly powerful. You can establish any angle for the Symmetry Plane but also use Symmetry Warps to mark corresponding areas on each side of the plane and then create geometry for both sides of an unsymmetrical model.

The Morpher system enables you to change the form of the reference mesh and guide the scene geometry to match those changes. For instance, when changing a face's expression, you can re-import it and Morpher will make the low-poly version match that expression, allowing you to create Normal maps for the wrinkles.

This new version of TopoGun delivers what it promises: the most optimised and specific toolset for retopology. And with its accessible price tag, you can't go wrong. It's a must-have in any serious 3D modeller's arsenal.



With Morpher, you can re-import the reference mesh with a different form and the low-polygon mesh will match the new form

*Price conversion correct at time of printing

Essential info

Price: $100 US / £66*

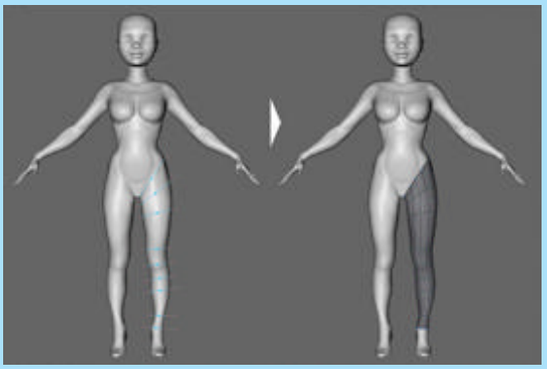
www.topogun.com

OPERATING SYSTEMS

- Windows XP, Vista, 7
- Mac OS X 10.4

TECHNICAL SPECIFICATIONS

- 1,000Mhz Intel Pentium III processor
- 512MB RAM
- 1,024 x 768 32-bit display
- 200MB available disk space
- Recent OpenGL 2.0-enabled graphics card with the latest drivers installed



With the Tubes tool you can draw a sequence of cross-sections, define the number of divisions and TopoGun will retopologise a tubular surface

The good & the bad

- ✓ Optimised toolset for speed and efficiency
- ✓ Symmetry Warps
- ✓ Morpher feature
- ✓ Texture baking included
- ✓ Handy helpline at the bottom of the screen
- ✘ Connect should have a number of loops option
- ✘ Occasionally reversed normals after using Connect operations
- ✘ Inability to move a vertex out of a surface with precision
- ✘ Currently no front, side and top views

Our verdict

Features	9/10
Ease of use	8/10
Value for money	10/10
Quality of results	8/10

"TopoGun is the most complete toolbox in the market for precise retopology"

Final Score 9/10

The HDR Light Editor now enables you to blur and tilt the environment as well as the place highlights in real-time via the Render window

KeyShot 4 Pro

A major update to KeyShot brings rendering enhancements, material and library updates, workflow improvements and interface refinements

REVIEW BY Craig A. Clark, freelance 3D artist, UK

From its HyperShot origins, KeyShot has matured into a superior product in its own right over the past several years. But why has it matured? Why is it superior? Well, the key for any software is a development team that listens and gives artists what they want. And this is where Luxion has been doing an awful lot right.

In comparison to KeyShot 3, this latest version brings improvements to the most basic area of any software: the user interface. No longer do you have to juggle and arrange floating windows (unless you want to), because they can now be docked to the main KeyShot window.

The Live Linking feature in version four sees a great gain for SolidWorks, Creo and Rhino users. This means that if you update the source file imported into KeyShot it will update seamlessly, without the need for re-importing and reassigning materials.

I was also pleased to find that KeyShot now offers greater flexibility with lighting. Unlike in previous versions, you are no longer tied to the environment or emissive materials. Physically accurate light sources can be applied to any piece of geometry in the scene, including the use of IES lights.

Industry designers will be particularly glad to see the full library of Pantone and RAL colour systems brought to the program as well. As a regular user of RAL colour schemes, I can't stress how useful this is.

Translucent materials are equally improved in version four, especially when coupled with the new physically accurate lights. The material interacts in a scientifically accurate way, making this in itself an industry-leading feature.

Rounded edges

This handy new option should come to your rescue...

For a recent client piece I was sent CAD files of some medical equipment. The files imported directly into KeyShot 3 – which was excellent, but they had infinitely sharp edges. I didn't have the required CAD software to do anything with the model. But now, in KeyShot 4 Pro, I can:

- Select the component in the scene tree
- Enter a numeric value for the size of the edge in the Properties
- Use the Minimum Edge Angle value to limit where the rounding is applied

This process is much simpler and more efficient than adding geometry, and aids in selling a render as a product photograph.

*Price correct at time of printing

Essential info

Price: $1,995 US / £1,406* (ex VAT)

www.keyshot.com

OPERATING SYSTEMS

- Windows 7 or 8, 32/64-bit, OpenGL 2.x or higher
- Intel-based Mac, Core 2 Duo processor or higher, Mac OS X 10.6 or later (including 10.8 Mountain Lion)

SYSTEM REQUIREMENTS

- Minimum 2GB of RAM
- Minimum 1GB hard-disk space
- Three-button mouse
- Monitor resolution of 1,024 x 768 or larger
- Internet connection for product activation

Great new features

A few other notable improvements worth highlighting:

- You can now assign specific models in your scene to render layers. This enables them to be separated into different passes
- Improvements to the live HDR Light Editor
- Enhanced options for importing models into KeyShot 4 Pro

The good & the bad

- ✓ **Live Linking for SolidWorks, Creo and Rhino users**
- ✓ **Rounded Edges will speed up any work with geometry**
- ✓ **Inclusion of RAL and Pantone colour libraries**
- ✓ **Access to physically accurate light sources**
- ✓ **Tidier interface through docking palettes**
- ✗ **The workflow is still quite cumbersome for pipelines not centred around SolidWorks, Creo or Rhino**
- ✗ **Systems with powerful GPUs won't be able to use their full available horsepower due to CPU-only rendering**

Our verdict

Features	**9/10**
Ease of use	**8/10**
Value for money	**9/10**
Quality of product	**9/10**

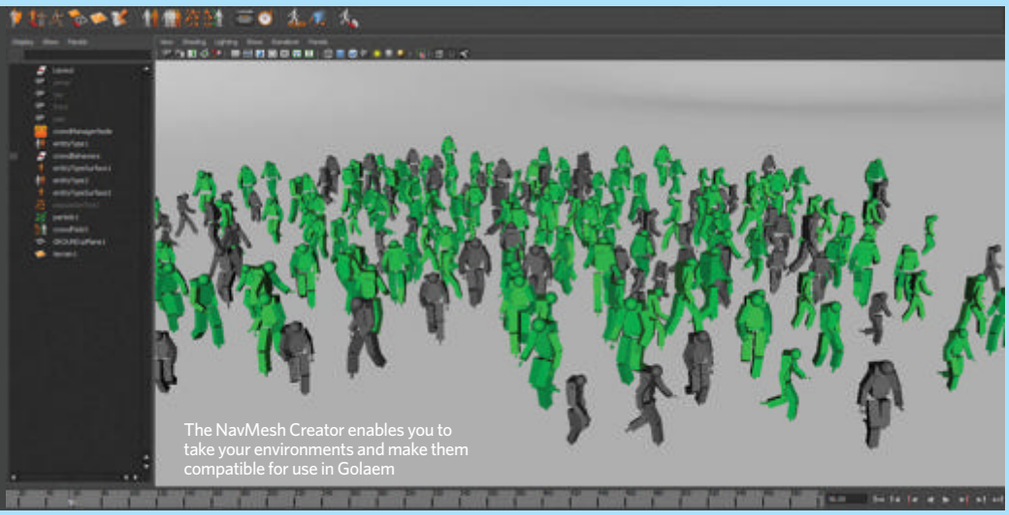
"This latest version is a big leap in the right direction and a worthy purchase"

Final Score 9/10

Golaem Crowd 2.2

Golaem's update to the crowd plug-in for Maya brings added advantages to an already solid piece of kit

REVIEW BY Jahirul Amin, director/producer and associate lecturer at NCCA, UK



The NavMesh Creator enables you to take your environments and make them compatible for use in Golaem

I remember being impressed with Golaem Crowd a couple of years back when I saw a cheeky promotional video (you can still see it at www.golaem.com/golaem-project). I never got my hands on it, but having played with the latest release, Golaem Crowd 2.2, I must say that I'm still a fan.

So what is Golaem? Well, it's a dedicated motion and navigation system that enables you to blend, mix and retarget animation data, then feed it into a crowd system using Maya's Particle setup.

Coming from a creative – rather than a technical – background, I was pleasantly surprised at how quickly I could work with this plug-in. The Behavior Editor in particular is fantastic, and the simple node-based approach gave some really quick and pleasant results. The accompanying documents and supporting videos provided do really help, although I don't feel they guide you through the process from A to Z.

Golaem is integrated into Maya, so there are no issues with having to learn a new package; everything felt comfortingly familiar. The workflow makes sense to me, changes can be made easily so you're not locked into decisions, and you can build up your crowd gradually. These are all big pluses. Additionally, it's easy to convert your environment into geometry that is compatible with Golaem using the NavMesh Creator. You can also use the MayaBullet physics engine with Golaem. By adding ragdoll behaviour you can simulate how crowds can react to others within the crowd and also their surroundings. Obviously, if you want to do something more extreme, like simulate the effects of an explosion on the crowd, you can do that too. Finally on the plus side, it can be fun to play around with the Field tools in Maya (and attack all the little people).

On the negative side, as a beginner I did find the rendering setup pretty irksome since there are so many steps to go through. Once you get the knack of it, though, the results are fast and the Asset Manager enables you to add variation to the crowd very easily. Golaem supports mental ray, V-Ray, RenderMan and 3delight renderers. Now, with Golaem 2.2, added to this list of these render packages is Arnold renderer. So if you're a Maya user in need of adding crowds to your toolkit, you should have no trouble integrating Golaem into your pipeline and rendering out with your favourite tools.

Using the Skeleton Motion Converter

Golaem brings an unprecedented ease to motion retargeting. The dedicated motion engine in Golaem 2.2 allows you to retarget mocap data onto new skeletons and extract animation data from skeletons that already hold animation information.

The three simple steps are to: convert your Maya skeleton to Golaem, map the skeleton, and then apply/extract the animation data.

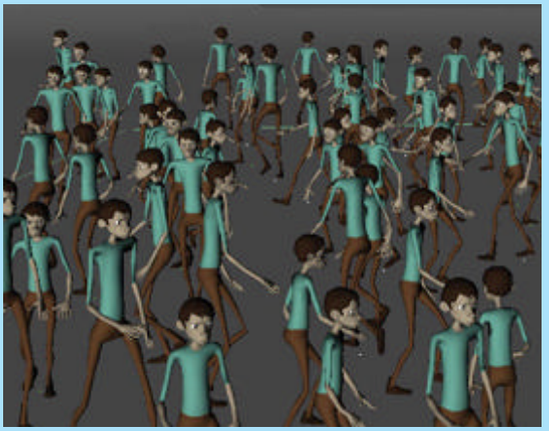
Essential info

Price: $6,599 US / €4,999 EUR
www.golaem.com

OPERATING SYSTEMS
- Windows/Linux – 32-/64-bit

TECHNICAL SPECIFICATIONS
- Maya 2011, 2012, 2013

Converting your Maya assets for use in Golaem is no trouble with the Asset Manager tool



The good & the bad

- ✓ Fully integrated into Maya
- ✓ Easy to use
- ✓ Achieve results quickly
- ✓ Motion retargeting is extremely solid
- ✓ Can be tailored using Mel or Python scripts
- ✗ Getting used to the render setup can feel needlessly complicated

Our verdict

Features	8/10
Ease of use	8/10
Quality of product	8/10
Value for money	8/10

"An ideal tool for Maya users looking to easily add crowds to their projects"

Final Score 8/10

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Crytek reveals how *Crysis 3* is changing the way we view current-gen videogame visuals

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Till Nowak takes us on a ride like never before with his vertigo-inducing mockumentary

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Concept artist Justin Fields discusses his path into the videogame and film industries in LA

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"We're working on realism in lighting, physics, characters and effects to achieve our vision"

Senior field applications engineer Sean Tracy discusses Crytek's look to the future of movie-quality gaming in real-time. Page 104

Crysis 3
We talk to developer Crytek about its top-of-the-line videogame engine, CryENGINE 3, and how one of the finest-looking videogames of this generation was created

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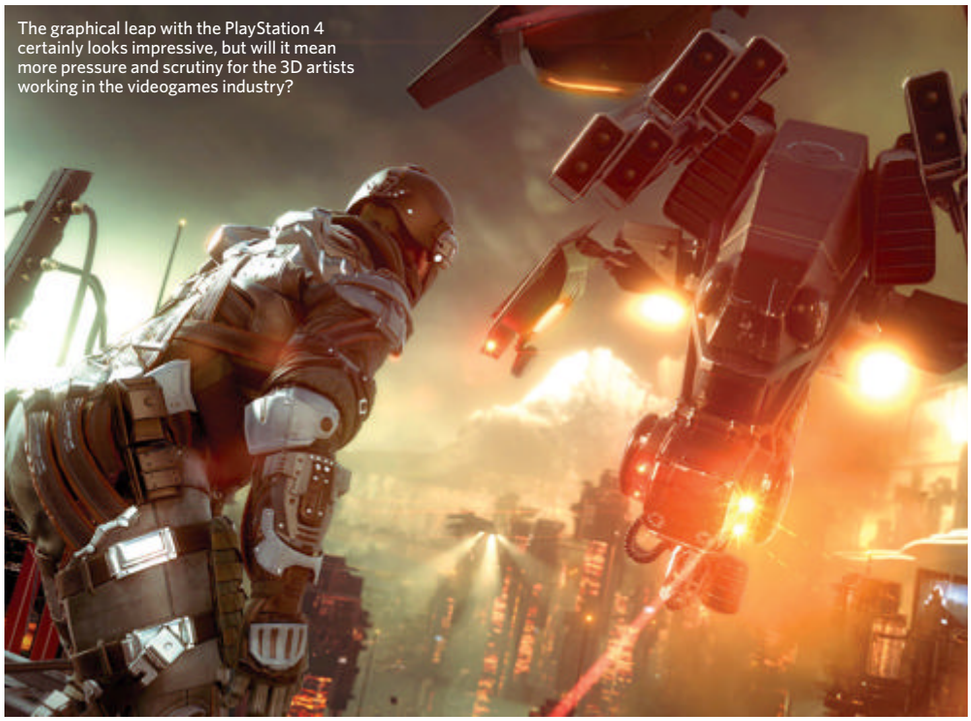
The graphical leap with the PlayStation 4 certainly looks impressive, but will it mean more pressure and scrutiny for the 3D artists working in the videogames industry?

The future of game art

Sony's next-gen console to push CG to exciting new levels

Sony Computer Entertainment recently took to the stage at a glitzy New York City event to announce the PlayStation 4, the first step into the world of next-generation entertainment.

Although Sony didn't reveal a price or the actual console itself, plenty of information was revealed. Regarding the hardware, Sony has ditched the Cell architecture that made the PlayStation 3 such a pain to develop for, instead opting for more familiar technology. The PS4 has been described as a "supercharged" PC, running off an x86-based CPU – similar to that found in most desktop computers – and an "enhanced" GPU. Both these components are designed by AMD. The console also hosts 8GB of memory, which is 16-times that found in the PS3.

While this powerful technology will provide gamers with some stunning visuals, it will also, inevitably, translate into greater pressure on the artists working on the creative side. The *Killzone: Shadow Fall* demo is dripping with gorgeous effects and detail, which all has to come from somewhere. CG is going to need to be more impressive than ever, and will come under an even greater degree of critical scrutiny as the next-gen becomes the norm.

So far 13 games have been announced, including the graphically impressive *Watch Dogs*, as well as innovative titles such as Media Molecule's – as yet untitled – follow-up to *LittleBigPlanet*. This is a tantalising glimpse of what we can expect in years to come. Microsoft? You're up to bat!

Though we are currently yet to see the physical machine, the PS4's potential in terms of sheer graphical power is something to get excited about

In-game sculpting

One of the most intriguing projects showcased on the PlayStation 4 so far is Media Molecule's follow-up to *LittleBigPlanet*. It's interesting for 3D Artist readers in particular, as this project enables users to carve and sculpt clay-like objects in the air using PlayStation's motion-sensing game controller, Move. In a sense it's not too far removed from a stripped-down version of ZBrush. The potential for getting this technology into schools and the hands of young children is immense.

"Opinion"

Raising the graphics bar

Geomerics founder discusses what the next generation means for 3D artists

Chris Doran www.geomerics.com

The PlayStation 4 represents possibly the biggest leap in terms of memory and GPU performance. So what will this mean for artists? Here's what *we* think:

- Novel geometry formats. The reliance on triangulated geometry will wane and more film technologies will be adopted.
- High-quality textures. We'll see a major boost in resolution for characters, textures and more.
- There will be light! On next-gen consoles, dynamic lighting and shadowing will be expected. Developers will be able to deploy all the techniques of film and dynamic lighting will become integral.
- Massive advances in post-production. Many of the techniques that give films their final look are achieved in post. The next generation will bring these techniques into the interactive realm, with local dynamic control over each pass.
- No compromises. A new generation of consoles will remove any constraints. This lasts until we get to work on the hardware and push each area to its new limits.

This is what the next generation means for graphics: raising the bar and opening up new ways for artists to achieve better results.

This scene is from a demo Geomerics is working on for GDC. It uses effects capable of running in real-time on hardware comparable to the PS4

● **HAVE YOU HEARD?** • 3 of the 5 films in the Best Animated Feature category at the Oscars involved stop-motion

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Rhythm & Hues files for bankruptcy

Financial crisis claims award-winning studio

The Oscar- and BAFTA-winning animation studio Rhythm & Hues has formally filed for Chapter 11 bankruptcy. A $20 million capital infusion of cash from Universal, 20th Century Fox and Warner Bros. was intended to keep the studio's doors open until Indian company Prime Focus could purchase the studio. Sadly, the deal fell apart, which forced the company into drastic reorganisation. The announcement was met by an outpouring of sadness and sympathy from the CG community.

The news comes after Digital Domain closed its doors last September and DreamWorks Animation has reportedly considered layoffs after losing money on *Rise Of The Guardians*, released last year. This picture painted for the future of the industry looks particularly bleak, especially considering that despite having provided work for *Snow White and the Huntsman*, *Life Of Pi*, *Django Unchained* and *Cabin in the Woods*, R&H still found itself in this kind of situation.

The outpouring of support for visual-effects artists recently culminated in a protest staged during the red carpet portion of this year's Academy Awards

"From all accounts, R&H was a company that appeared, from the outside, to be run well, to take care of its employees, to take advantage of worldwide tax incentives and [have bases of operation] in several countries," declared Eric Roth, executive director of the Visual Effects Society. "If a company like that can't survive in today's marketplace, is this the moment when the industry at large takes notice and says 'maybe we need to take a fresh look at how we do business?'"

VFX success at the Oscars

A mix of highs and lows for the visual-effects industry

This year's Oscars was a tumultuous affair. VFX artists protested against outsourcing in the VFX market; the *Jaws* theme drowned out an attempt to mention Rhythm & Hues' bankruptcy on stage, while Ang Lee seemingly failed to thank VFX artists in his Best Director speech. On the bright side, though, *Life Of Pi* won a deserved award for Best Visual Effects, while 'Paperman' and *Brave* received Best Animated Short Film and Best Animated Feature Film respectively. Well done to all involved!

If you missed it at the cinema, *Life of Pi* is out now on DVD and Blu-ray

Faceware's tech has been used in such projects as *The Curious Case of Benjamin Button*, *Red Dead Redemption* and *Crysis 3*

Retargeter 4.0

Version 4.0 of the facial mocap tool debuts

Faceware has announced Retargeter 4.0, an update to its multiplatform plug-in for retargeting facial mocap data onto an animated character. "In the two years since Retargeter was released, the most common challenge was consistency in the initial solve," says the developer. "The new workflow reduces the amount of effort in creating this initial solve...

"An improved character setup enables automatic consistency, while an upgrade to the shared post-library functionality aids in the management of teams," concludes Faceware. Learn more at www.facewaretech.com.

Software shorts

Bringing you the lowdown on product updates and launches

V-Ray 2.4 for 3ds Max

Chaos Group has released an update to its V-Ray for 3ds Max renderer. The main improvements see V-Ray 2.4 for 3ds Max include support for Cyber Radiance's Hair Farm 2.0 and V-Ray RT support for iToo Software's Forest Pack. In addition to this, the V-Ray RT interactive preview now supports instancing and geometry can be imported in Alembic's ABC format via VRayProxy. A new licence will cost $1,350 US. Find out more at www.chaosgroup.com.

MentalCore 1.5

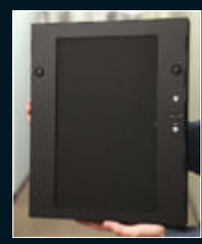
CoreCG has updated its mental ray toolkit MentalCore. New features in MentalCore 1.5 include a new Light Select render pass, which can speed up the creation of per-light passes. There's also a Diagnostic render pass for outputting sampling information when using unified sampling. Other features include a new Texture Lookup and Architectural Light shaders. The update is for Maya 2011 and costs $199 for a node-locked licence, or $249 for a floating licence. Learn more at www.core-cg.com.

Carbon Scatter 2

e-on software has produced a new version of its vegetation-instancing plug-in. Carbon Scatter 2 introduces new super-fast population algorithms (you can create over a million instances per second), support for display technologies like 3ds Max's Nitrous viewport and the option to control the placement of objects using curves. The software is free for registered users, or $195 on its own. Learn more at www.carbonscatter.com.

Capture images in 3D

A new revolutionary 3D camera takes off


The Lynx device smashed through its Kickstarter goal of $50,000 US

Texan start-up company Lynx Laboratories has successfully funded its new Lynx A camera – and then some – through Kickstarter. The Lynx A is an interesting new device that promises to act as an all-in-one 3D scanner and mocap camera. You can use the tool for making scenes or objects by panning the camera around the object or environment you want to capture. The device will then automatically build it as a textured 3D model. You can also use the device for motion capture. Simply record handheld video footage of an actor and have the Lynx A extract skeletal mocap data in BVH format. You can learn more at **www.lynxlaboratories.com**.

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Course Focus

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www.nua.ac.uk/bagamesartanddesign

creative skillset

NUA's BA Games Art and Design course has established an outstanding reputation as a leading provider of industry-relevant education. The course has achieved Creative Skillset accreditation and its strong links with the industry have ensured a professionally relevant qualification, while a team of recent graduates won the BAFTA Ones to Watch Award at the 2012 British Academy Games Awards.

All this means there are few better places to start your career in videogames. "Out of 200 games-related courses in the UK, there are only around 13 that focus on the design side of games and aren't that computer-science-based, so ours is already in a fairly select group," says course leader Marie-Claire Isaaman. "[We run] lectures in creative development, such as lighting or composition, or we might conduct a study on a specific studio or an artist within the sector..."

The course also teaches the overlooked-but-essential communication skills required of a designer. Teams work together to develop a creative document, pitch it to staff and industry guests, and then use it to develop artwork elements. Students also perform relevant audience, distribution and marketing research to expand their knowledge of professional practises. "All of these factors are integrated into the course, so professional practise is taught alongside studio practise, contextual studies and the theoretical components of the curriculum," says Isaaman. "This helps students when it comes to discussing their work in a professional setting."

To learn more about the program head to www.nua.ac.uk/bagamesartanddesign.

> "The course is unique because of its attention to detail in relation to the design aspects of videogames"
>
> **Marie-Claire Isaaman,** course leader

The tutor

Marie-Claire Isaaman

As the leader of the course, Isaaman's research interests lie in a range of areas. These include drawing, popular culture, designing games, exploring the art form of videogames, future casting for digital media, transmedia storytelling and much more. She has worked in art education for over 20 years and is currently the art director for a range of commercial game-design projects involving students.

A Bryan Morrison
In the first year students form a solid foundation of skills to build on. A range of topics are covered, including an introduction to concept visualisation as well as digital sculpting

B Michael Hansen
Preparing for graduation is more than just building up practical creative skills. For example, students develop creative design documents and pitch their concepts to staff and industry guests

C Sam Westall
Each of these images is from the students' final degree show. The event showcases the diverse body of work that's created during the students' time on the course

D Dariusz Makowski
Knowing how to present yourself to the world is vital. As such, every student creates a professional website to showcase their portfolio and showreel to potential clients

E Zoltan Fejes
For students to be considered for a position on the course, they must not only have a great interest in playing videogames, but also in discussing and analysing the art form

Studio Access

CryENGINE graphics

Crytek discusses the graphical innovations showcased in the Crysis 3 videogame

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A

Crytek is a German videogame company founded in 1999 by brothers Cevat, Avni and Faruk Yerli. The studio made its name with 2004's first-person shooter *Far Cry*, which introduced the company's trademark focus on freeform gameplay. Over the years the company has evolved into one of the industry's biggest names, largely thanks to the development of its visually stunning CryENGINE tech.

www.crytek.com

Project *Crysis 3*
Description Following on from its two predecessors, *Crysis 3* continues to tell the story of Prophet – or perhaps more significantly the story of the CryNet Nanosuit, which powers the character throughout the game. An open-level design and gorgeous graphics are the core focus, with the player exploring a Manhattan overtaken by nature, and CryENGINE 3 cranking out the stunning visuals at full blast.
Country Germany
Software used Maya, 3ds Max, ZBrush, Mudbox

Few videogame developers take graphics as seriously as Crytek. For years now the company has dedicated itself to evolving the industry through art, turning its proprietary CryENGINE technology into a beast capable of pumping out some of the most beautiful and convincing visuals ever committed to silicon. No stone is left unturned when it comes to detail and no expense is spared when setting the scene.

Crysis 3 is the third game in its sci-fi FPS series and is one of the most graphically sumptuous shooters of its time. Here the setting is 2047 Manhattan, but the sprawling cityscape is encased by a giant Nanodome and it has been transformed into a lush urban rainforest. As the Nanosuit-clad Prophet, players must approach various combat scenarios as they see fit. The suit's many features – such as invisibility, super strength and super speed – can be used to take down the alien Ceph and the corrupt C.E.L.L. forces.

Graphics are truly at the core of the title and Crytek has wielded CryENGINE 3 with great flair. It'd be hard for any to deny that in terms of photorealism it's one of the best-looking games ever built. "We believe that with the further enhancement of DX11 hardware and GPGPU, we are on the cusp of a renaissance in gaming technology," says Sean Tracy, senior field applications engineer at Crytek. "We're working on realism in lighting, physics, characters and effects to achieve our vision of movie-quality gaming in real-time within the next few years."

The team is already not far off, with *Crysis 3*'s verdant jungle environments jaw-droppingly stunning when viewed on a high-end PC. This is to be expected, however, given the team's familiarity when it comes to scenes packed with vegetation. "*Far Cry* and *Crysis* obviously gave us a lot of experience for creating jungles, from both a technical and artistic point of view," says senior lighting artist Pierre-Yves Donzallaz. "Our first results weren't highly realistic, but now we have talented artists who specialise in modelling and texturing high-quality models for trees, bushes, grass and so on. Also, over time our editing department has provided great tools that enable us to paint vegetation on most of a level's surfaces."

> "Players will be treated to visuals that have yet to be seen in gaming"
> **Sean Tracy,** senior field applications engineer

The CryENGINE Sandbox tools, which enable Crytek's developers to quickly place foliage and other level features, have been invaluable. "The toolkit has really evolved over the years and is now integral to quickly and effectively creating jungles and heavily overgrown environments," says Tracy. "Some of the small improvements now enable artists to easily place and modify vegetation on terrain as well as geometry – such as rocks and buildings... Others allow for a massive amount of vegetation to be simulated based on the physical forces in the world."

This physicality in the vegetation has been a big point of focus for the Crytek team, with player

B

Contributors

Magnus Labrant
Senior art director

Mihai Titoiu
Senior concept artist

Pierre-Yves Donzallaz
Senior lighting artist

Marcel Shaika
Principal environment artist

Tom Deerberg
Senior environment artist

Gregor Kopka
Senior 3D artist

Sean Tracy
Senior field applications engineer

Tiago Sousa
R&D graphics engineer

Portfolio highlights

Some of the big-budget projects Crytek has worked on include:

2013 *Warface*
2013 *Crysis 3*
2011 *Crysis 2*
2008 *Crysis Warhead*
2007 *Crysis*
2004 *Far Cry*

A The *Crysis* series is not just graphically impressive, but also artistically. There are plenty of imaginative designs and the lead character's Nanosuit has won a red dot Best of the Best award

workspace
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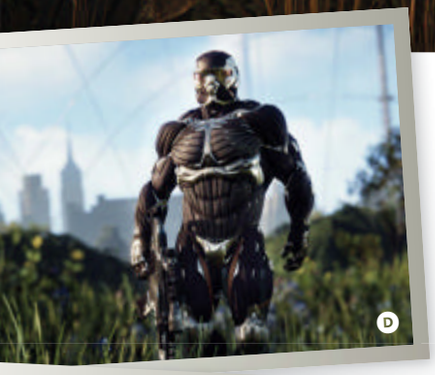
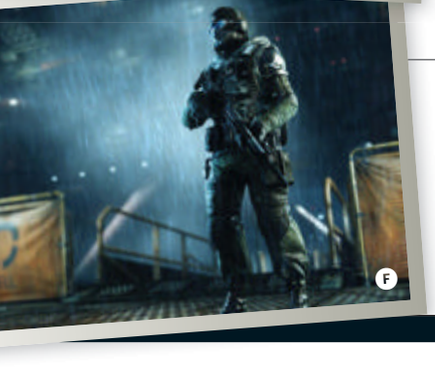




interaction and environment effects both having an affect on the various plant life.

"In *Crysis 3* we have the ability to paint millions of blades of grass, all of them interacting with the player, AI, objects, explosions and even wind," says Donzallaz. "This feature adds an immense amount of life and gameplay value to usually static scenes. In the end, it's the right mix of art and tech that enables us to create the best-looking natural environments in the industry."

This isn't the only way Crytek has increased the tactile nature of its world, though. Through CryENGINE 3 the team has also introduced a variety of new environmental effects that give the game a real sense of tangibility. One such technique is CryENGINE 3's pixel-accurate displacement mapping.

"This new form of mapping was uniquely engineered for *Crysis 3*," declares Tracy. "It gives CryENGINE 3 the ability to render massively detailed geometry with no visible polygon edges on the silhouette of the displacement, all without the need for tessellation. This pushes the graphical envelope in terms of pixel shading and performance, as the technique is best used when scenes become vertex-bound. These are effectively scenes with high vertex counts and shaders that may not be able to utilise tessellation."

Another technique developed for CryENGINE 3 was establishing real-time volumetric fog shadows. "We tried to break the usual flat-fog look in games by

Mastering a jungle

Pierre-Yves Donzallaz discusses the challenges of creating an overgrown New York

"Although we've gained a lot of experience in creating realistic jungles since the first *Crysis*, [this title posed] a much more complicated task... First, in an urban rainforest the amount of assets and their complexity is much higher than in a simple jungle. We had to build overgrown buildings with partial destruction and then dress these with vegetation to create the desired look. It was an even greater challenge to run the game on seven-year-old consoles without sacrificing the quality on a PC. Imagine *Crysis 2*, add an insane amount of vegetation and open levels, while creating an even better experience for both visuals and gameplay. This is all in *Crysis 3*."

B The detail on each character's face is immense, supported by lifelike animation. With thanks to tools such as the Faceware Retargeter, we can expect even more from the next generation

C The Crytek team has ensured that the CryENGINE tool supports as many content-creation pipelines as possible. This means experts with various DCC tools can make use of it

D Lens flares and various other aberrations have been a big focus for the Crytek team, with such techniques used to enhance the sense of immersion. However, players can turn them off if they so wish

E CryENGINE 3 introduces tessellated vegetation to the mix, which enables highly detailed flora and very smooth shapes. It can even be applied to low-poly objects such as ferns and long grass

F The lighting that CryENGINE 3 is capable of is truly impressive, achieved with a mix of global illumination and real-time effects. Even particles such as sparks can now emit their own light sources

G

introducing shadow support into our global fog simulation," explains Crytek's principal R&D graphics engineer, Tiago Sousa. "In essence we ray march across a volume and check if a certain point on the plane is receiving shadow or not – then we conduct some trickery to make it efficient. In particularly dense fog conditions, you'll notice shadows when walking around the environment. This yields a far more realistic and accurate look to the entire environment."

Simulating water, too, has been a point of focus. "Reactive caustics are a very nice improvement to our already top-quality water shaders and rendering," says Tracy. "Caustics are now generated in real-time based on interaction with the water. Should a wave be propagated, the corresponding shape will appear in the caustics. This is a very pleasing visual effect that is seen quite obviously in the real world and hasn't yet been achieved in gaming to this degree."

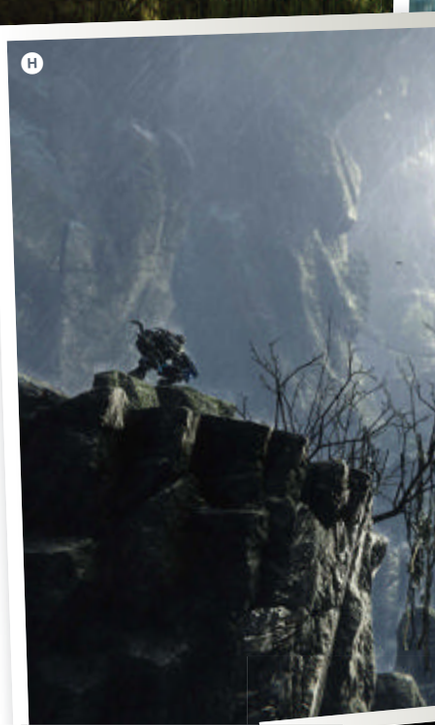
However, as any good 3D artist knows, it's lighting that truly pulls a scene together and Crytek has been pouring a great deal of energy into that aspect of *Crysis 3*'s production. "Besides using great art, the magic behind our nice lighting is a physically based foundation investment [along with consistently] real-time and linearly correct maths, HDR rendering and image-based lighting," says Sousa. "The real-time area light is a recently introduced feature. Light sources in videogames are usually simulated analytically via an infinitely small point or directional light source. This is a fairly good approximation for most cases, but in the real world light can come from anywhere and has a volume – this affects shadows and the appearance of light reflection. For example, your computer monitor casts light from a rectangular-shaped volume. We try to approximate such cases with this technique."

It's not only light that's been considered, but the shadows it casts. "Physically plausible lighting

Let there be light

Senior field applications engineer Sean Tracy sheds some light on Crysis 3's global illumination

"The current implementation of CryENGINE's global illumination uses a technique that doesn't require lightmaps and is calculated completely in real-time. In *Crysis 3*, the GI data can be used for smooth, glossy reflections that realistically reflect the current environment and the dynamic objects in it. This is because the GI is calculated using Light Propagation Volumes, which means it's done in a 3D grid and is more physically plausible than other implementations. The real-time nature of the feature also enables instant feedback to the artists. This enables unique opportunities whenever making drastic changes to lighting conditions within a level."



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G The jungle scenes in *Crysis 3* are some of the most believable ever committed to a videogame. This is thanks as much to environment effects as the modelling work on the foliage itself

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K

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requires a shadow-softening technique. In the real world the penumbra (edge) of the shadow varies greatly depending on its distance to the caster," explains Tracy. "To imitate this we use an approximation, called 'Variable Penumbra Soft Shadows', to vary the penumbra of the shadow based on its distance to the caster."

Even the ubiquitous particles and various effects encountered throughout *Crysis 3*'s explosive gameplay will be able to cast and receive their own shadows. "For *Crysis 3* the particle lighting system has been greatly improved and optimised," says Donzallaz. "Now particles can receive lighting from deferred lights as well. This enables the creation of more-realistic ambient smoke effects or fires. For instance, muzzle flashes, alarm lights and fires can now affect the surrounding smoke and mist. Effects are really part of the environment and they require almost no light baking."

Finally, there's been an increased effort to immerse the player in the world through effects such as 3D lens flares. These produce stylised HUD distortions in a manner similar to film and photography. "The Nanosuit is equipped with a tactical visor in order to create a more immersive experience," says Donzallaz. "Most key lights in the game are able to produce flares, orbs, streaks and other kinds of visual aberrations. These are due to the scratches and irregularities on the visor. However, the right balance of stylisation and gameplay must be struck to avoid exaggerating such effects. The artists can achieve this thanks to the large degree of control over the flare elements. "Using the Flare Editor, artists and designers can load presets with one click and try out many different looks for the flares within just a few seconds," explains Tracy. "The artists can combine multiple presets to create the ultimate 3D lens flare. With additional tech to perform occlusions and other procedural effects, players will be treated to flare visuals that have yet to be seen in gaming."

Crysis 3 is packed with immersion-focused and photoreal techniques that set it at the forefront of current-gen videogame visuals. So whatever Crytek is up to next is no doubt going to be thrilling indeed. "We are really excited about the games we are going to see built with our technology in the future," says Tracy. "We will continue to set the benchmark for the quality of gaming visuals... We'll be empowering all our developers with new features, platforms and even more for CryENGINE over the next year."

> "It's the right mix of art and tech that enables us to create the best-looking natural environments in the industry"
>
> **Pierre-Yves Donzallaz,** senior lighting artist

H On the rendering side, Crytek has now moved to a new hybrid-deferred renderer, which enhances the multi-sample anti-aliasing on complex scenes. The results are truly fantastic

I In *Far Cry*, wind or physical interactions with vegetation were simulated using a simple shader trick. In *Crysis 3* they're in full real-time, with simulated wind even affecting the blades of grass

J In *Crysis 3* a giant Nanodome has been placed over Manhattan. Adorned in the rather fancy-looking Nanosuit, protagonist Prophet must take out the aliens and soldiers inside – usually with a bow

K The new water caustics implemented in *Crysis 3* are particularly impressive. The results are astonishing when the character is moving through the water and firing into it with his powerful weaponry

L What can we expect from next-gen graphics? According to Sousa, a big jump in on-screen content, physics simulations and animations. The recent PS4 reveal has certainly confirmed this

Project Focus

'The Centrifuge Brain Project'

Till Nowak creates the world's most terrifying roller coasters in this tongue-in-cheek mockumentary

Project 'The Centrifuge Brain Project'

Description Based at the Institute for Centrifugal Research, Florida, this mockumentary tells the story of chief engineer Dr. Nick Laslowicz and his 30 years of creating vertigo-inducing amusement park rides. Ostensibly built in the name of science, each ride is more dangerous than the last, from 14-hour Ferris wheels, to catapults that launch riders into the sky.

Location Germany

Artist bio Till Nowak is a digital artist, designer and filmmaker based in Hamburg, Germany. He has worked as a professional CG artist since 1999.

www.framebox.com

Contributors

Till Nowak
Director

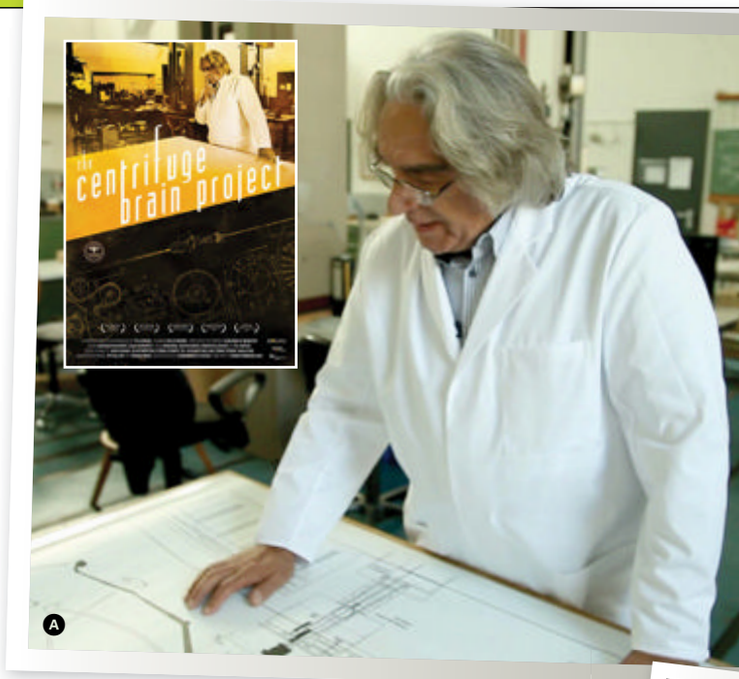
Ivan Robles Mendoza
Director of photography

Leslie Barany
as Dr. Laslowicz

Digital artist Till Nowak still remembers his youthful, wide-eyed astonishment at the roller coasters, drop towers and tilt-a-whirls of amusement parks. "Ever since I was a child looking at amusement rides, I have always felt this strange mix of fascination, thrill and confusion about the fact the we humans build giant robots, adorn them with pretty, blinking lights, and then install them... in amusement parks," he recalls. "By the age of 30 I had both the digital tools and the know-how to build my own crazy amusement park. I wanted to explore this territory by using over-the-top exaggeration, while at the same time maintaining an eyewitness-like appearance."

The result is 'The Centrifuge Brain Project'. Presented in a mockumentary format, the short film follows Dr. Nick Laslowicz, chief engineer at the Institute for Centrifugal Research, as he presents a variety of questionable rides, each more dangerous than the last. The film exhibits each as archive footage, with the nausea-inducing creations being captured by passers-by with handheld cameras.

Nowak started building his original plates using matchmoving software SynthEyes. "The background videos were shot without markers or special equipment. However, there were basic principles that made the footage easily extendable," he tells us. "The camera only rotated around its own pivot, but was not moved from its location, so by standing still I could use the Tripod in SynthEyes. With this option the software doesn't need to calculate the three-dimensional position of each tracked point, it just assumes that every point is located on one surrounding sphere."



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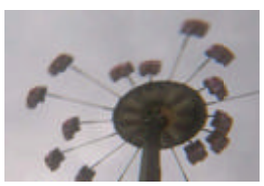
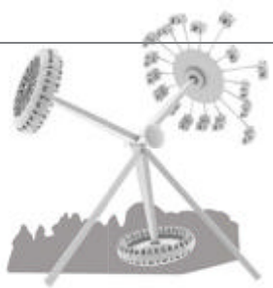
The process for the photorealistic digital extensions was based on a technique commonly known as camera mapping. "My standard workflow to manipulate objects in a real video is to re-create them via camera mapping from a still frame in 3ds Max," says Nowak. "I look for a frame that offers a clear look at the object, retouch any occlusions, then separate the foreground and background of this one frame in Photoshop. The resulting rotoscoped objects – for example, the passenger cabin of a ride – are then put in the viewport background of 3ds Max as a kind of perspective blueprint to start rebuilding the object via camera mapping. The resulting 3D object is usually geometrically very rough and messy, but it blends perfectly with the background. As the texture was extracted from the video itself, the colour, contrast and lighting already perfectly matched the background video. With some practise it's possible to build a nicely integrated set extension based on existing elements in the original video within a few hours."

After using V-Ray for the rendering process, the initial passes were then matched to the background videos with a number of subtle filters in After Effects. "This final step is crucial to making the border

> "With some practise it's possible to build a nicely integrated set extension based on existing elements in the original video within a few hours" **Till Nowak,** director





A Leslie Barany played the part of Dr. Nick Laslowicz. "He's an incredible mix of a freethinker and a naughty boy [that was] perfect for the character I had in mind," says Nowak. Incidentally, Barany is also the agent for the renowned artist H.R. Giger

B In order to create elements such as the Ferris wheel cabins, Nowak would take a clean frame featuring the original cabin, retouch it in Photoshop, then re-create the cabin in 3ds Max. These new elements were then able to blend perfectly into the original plate

C Nowak says the hardest part of the project was the editing. "I recorded around three hours of conversation with Barany," he says. "I had to boil it down to just a few minutes. I hadn't expected it to take long, but in the end I spent six to eight weeks just editing"

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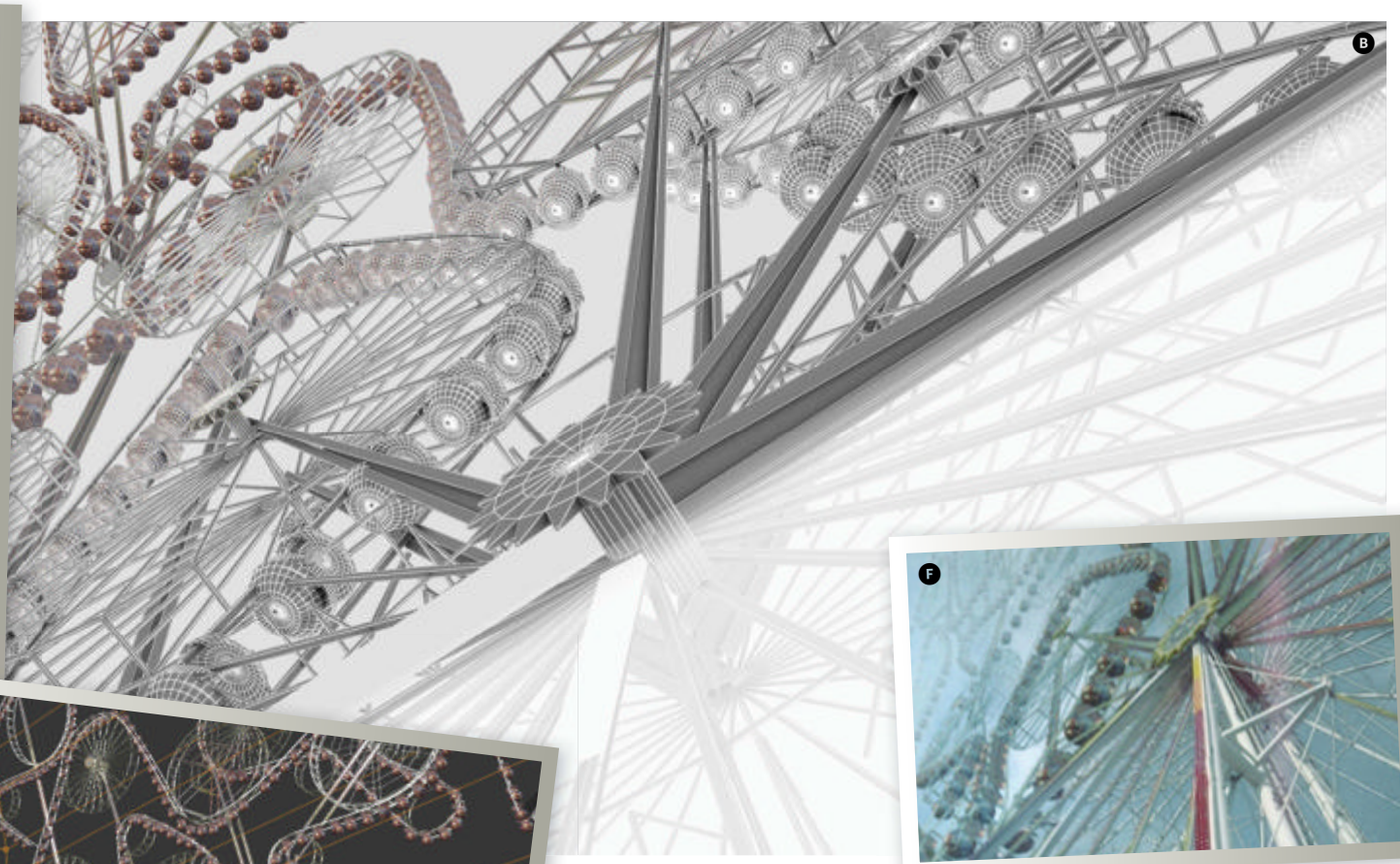
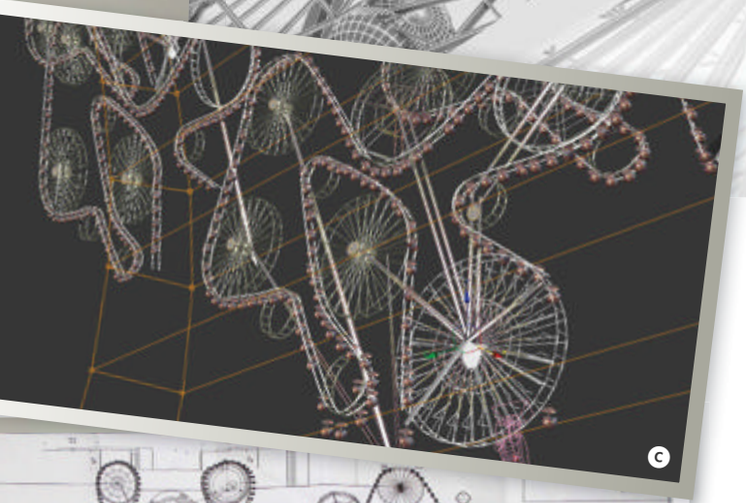




Keep your hands inside the car

Nowak discusses how he animated his film's various contraptions

"There were two main steps to creating the animation. After the matchmaking, the actual motion of the filmed footage of the rides had to be detected and re-created, because the digital elements always connect to these actual moving parts. Since the axes of the machines are fixed and they move mechanically, it was possible to match the original motion manually, based on the background videos. The second step was animating the digitally extended parts of the machines. No individual rig was created, but simple rigid geometry was parented hierarchically and animated in groups. Often a number of similar elements were animated together so that they moved in parallel, before splitting them up into groups and shifting key frames on the timeline to create an organic feel."

between real and artificial elements invisible," says Nowak. "Since the background videos were shot using an automatic aperture, it was necessary to first animate the brightness and contrast of the artificial elements to match the brightness of the background. Afterwards I added noise and blur according to the background video, a subtle glow, flares, some chromatic aberration as well as some additional motion blur using ReelSmart Motion Blur."

The final result is a humorous and unique short that shouldn't be missed by anyone intrigued in set extensions and innovative filmmaking. However, for Nowak there's still one thing missing from the short: "Computers still can't simulate the kick of real centrifugal force – you need a real amusement ride in a real amusement park for that. So what are you waiting for? Let's go for another ride!"

D Nowak created plenty of blueprints and documentation for his madcap amusement attractions. Although they only show up in the finished project once or twice, you can appreciate how much work was actually put in

E When Nowak initially filmed the rides in question, he "repeatedly panned the camera towards the empty sky above, seeing in my mind's eye the digital extensions I would later fill it with". Nowak spent three years collecting his footage

F As there were many trackable objects in the original plates, such as trees and buildings, matchmoving was mostly straightforward. When only blurry clouds were in the frame, however, Nowak had to use manual frame-by-frame tracking

Industry insider

Hollywood careers

Justin Fields, concept artist

We find out how this artist made his break into the industry and how you could do the same

About the insider

Job Concept artist

Education Gnomon School of Visual Effects

Location Los Angeles, California, USA

Biography Fields is a concept artist from the Gnomon School of Visual Effects, currently working in the film and videogame industries. He was born in Springfield, Illinois, and has worked in computer graphics since 2005, specialising in creature, prop and environment design. During his career he has worked at such studios as Amalgamated Dynamics, The Aaron Sims Company, Imaginary Forces and he's created training for Digital-Tutors and many others.

www.justinfields.com

EXPLORE ALIEN DESIGN WITH JUSTIN FIELDS
page 70

For those captivated by the ever-developing fields of videogames and movies, there are few more desirable roles than that of the concept artist. Given a brief and a blank page, the concept artist is free to let their mind roam free, creating new worlds and beasts with a swipe of their brush. Taking ideas from the imagination and seeing them transposed to the grandeur of the silver screen is the ultimate goal for any entertainment-focused creative.

This was Justin Fields' goal, at least. Having spent his youth watching the likes of *Aliens* and *Starship Troopers* – with many months of high-school lunchtimes sketching illustrations of Spider-Man – life in the movies was his ultimate goal.

Getting there was no easy task, though. As a graphics artist, Fields' career started out in logo design and retouching. It wasn't until attending the prestigious Gnomon School of Visual Effects that his real calling began to reveal itself as he landed a role at The Aaron Sims Company not long after graduation.

We sat down with Fields to discuss the hardships that come with becoming a concept artist and to discover the steps he took to get there.

Can you tell us a little about yourself and your history as an artist?

I started out as a graphic designer but over the years became less and less happy with my chosen career path. However, I've always loved characters and creatures. As I grew up on *Star Wars, Aliens, Predator, Starship Troopers* and the like, I began to fall in love with concept art and the film industry. Games like *Halo, Gears of War* and *World of Warcraft* really sealed the deal for me. So many amazing artists work together to create thrilling visuals and worlds that feel like living, breathing entities.

Can you talk a little about your education and any inspirations that drove you on?

I sent my portfolio to The Gnomon School of Visual Effects on a whim. I was very excited to attend the school due to its awesome reputation. While there I was heavily influenced by the instructors who [eventually] helped me on my path to becoming a concept artist. Instructors like Jerad Marantz, Aaron Limonick, Brett Bean and Travis Bourbeau really helped me with great advice, inspiration and industry wisdom. While I was at the school artists like Neville Page, Ben Procter, Dylan Cole and Dan Luvisi were also awe-inspiring. I knew the road to my ultimate goal would be hard, but I took to it like a sponge – and still do. I will always be happy with how far I've come, but never totally satisfied.

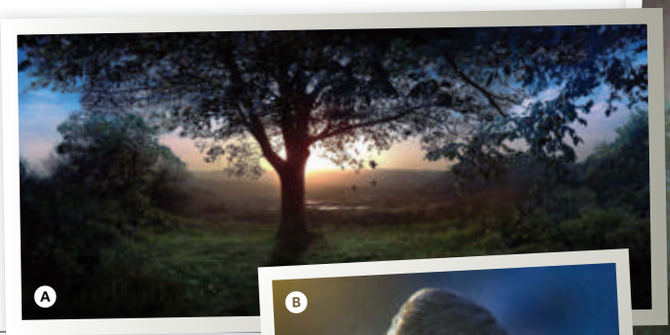
You currently work in both the film and videogame industries. What differences do you find between the two in your work?

Deadlines! Film work is fun because it's fast and furious and you get to design many things at once, whereas with videogames you get to doodle and really produce nice illustrations between iterations. However, most of the time – in both fields – your work is never finished, it's just due.

ZBrush tips

Fields gives his top tips on alien concept design using Pixologic's sculpting software

"Reference and lighting [are essential]! Really take the time to gather up images and ideas before jumping into a piece. Having a good eye for film and knowing how things get lit for specific scenes is really helpful. Sculpting with traditional materials as well as within ZBrush also helped me to wrap my head around creatures."



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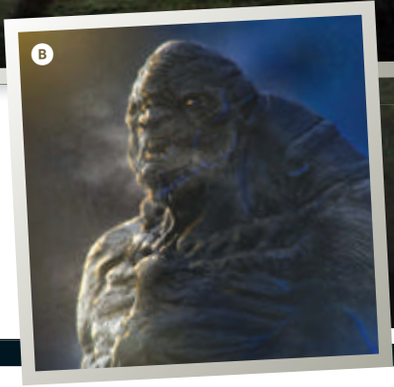

B

portfolio highlights

Some recent features that Justin Fields has worked on include:

2014 *Dawn of the Planet of the Apes*
2014 *Jupiter Ascending*
2014 *Maleficent*
2014 *Noah*
2013 *Iron Man 3*
2013 *Tethered Islands*
2013 *The Wolverine*
2012 *Falling Skies season 2*

A Not every bit of concept art is about creating strange alien worlds. It could be used to test colour options, such as in this sunset piece

B When presenting any concepts to be considered – but especially creatures – try to imagine how they would look in the actual world of the final result

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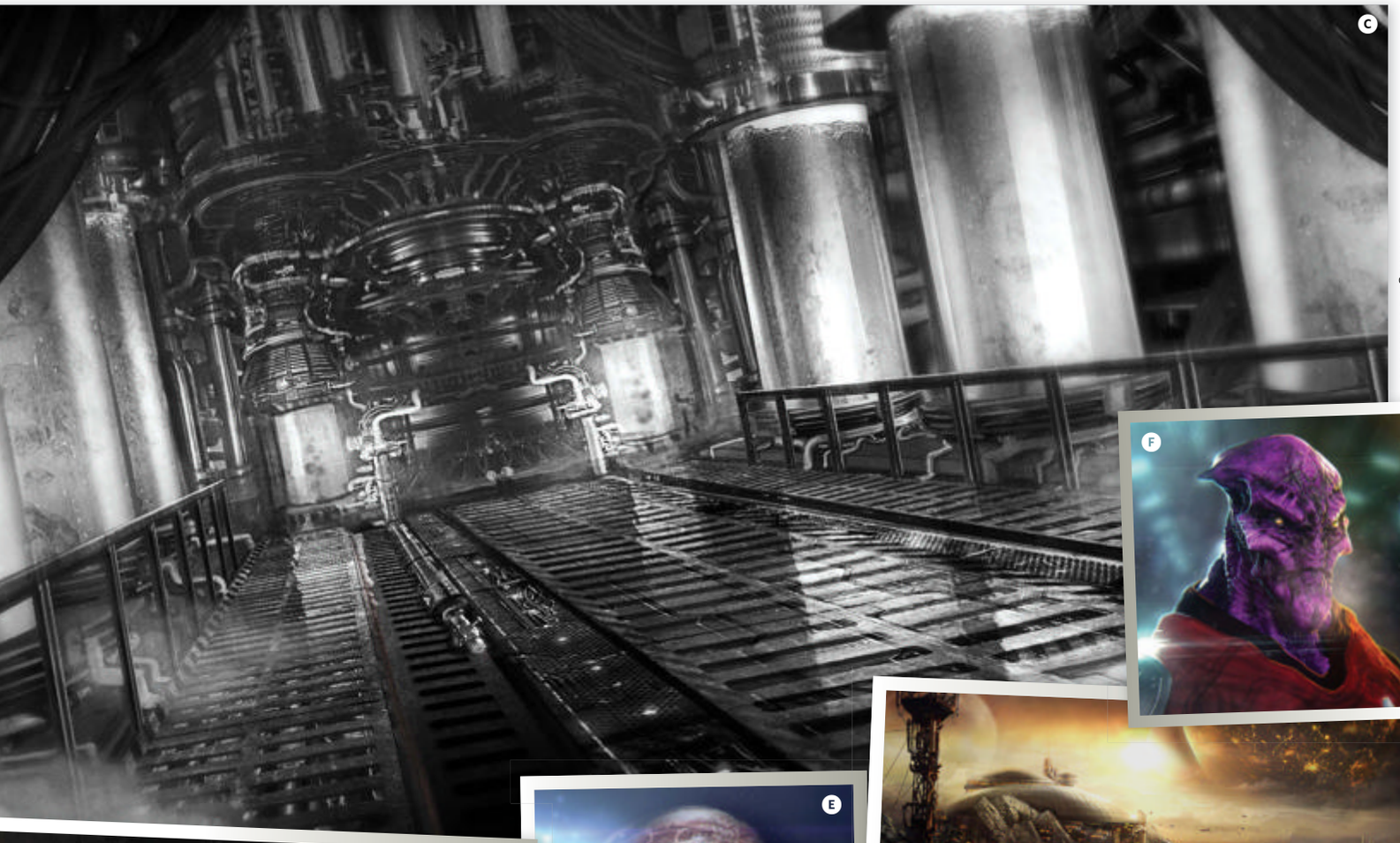

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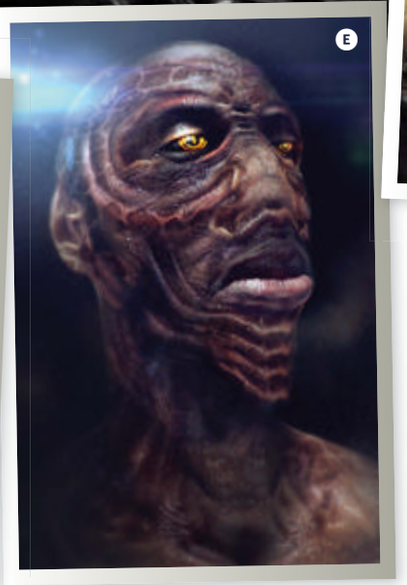

How difficult is it to become a concept artist in today's industry? What do you need to do in order to be successful?

It's always hard to get a foot in the door. My advice is to make contacts, be professional and work hard. Speed comes with time, so focus on just designing at first and when a paid internship comes your way, drop everything and make it your priority to learn and absorb the talent around you. After three months, start looking for a paid position. People get taken advantage of in this industry so make sure your best interests are in mind when making decisions.

> "Most of the time, in [films and videogames] your work is never finished, it's just due"

C "Every project is challenging!" says Fields of his work, such as this complex image. "Each piece is a chance to hone your skills and try out new ideas..."

D ZBrush is now very common in concept design. This character was created for Digital-Tutors to teach his tried-and-tested ZBrush workflow

E Unique design is key when designing a character. Here the recognisable human elements serve to make the character seem more alien

F Strong use of lighting can really help to sell a concept. Here Fields has used *Star Trek*-esque lens flares to set the scene and direct the viewer

G Designing totally new and unseen worlds (like this one) is just one of the many tasks concept artists are expected to complete on an almost daily basis

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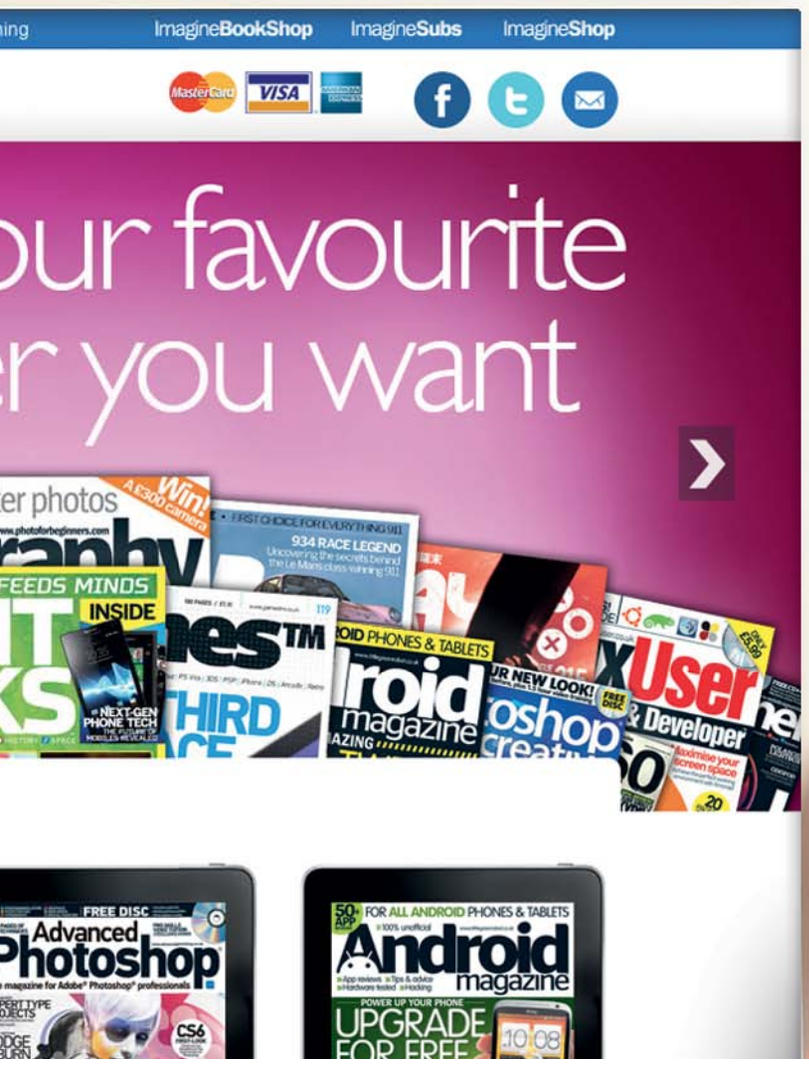

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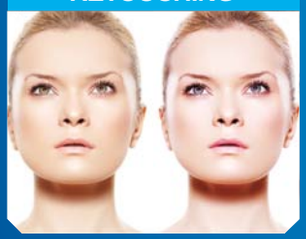			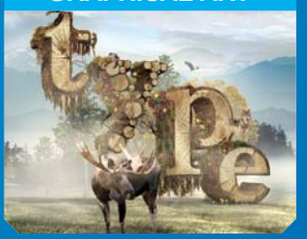	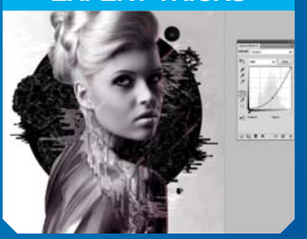

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